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Duncan.

ELEMENTS

OF

THE PHILOSOPHY

OF

The Human Mind.

BY DUGALD STEWART, ESQ. F.R. SS. LOND. & EDIN.

Honorary Member of the Imperial Academy of Sciences at St. Petersburgh; Member of the Royal Academy of Berlin; and of the American Philosophical Society held at Philadelphia; formerly Professor of Moral Philosophy in the University of Edinburgh.

WITH TRANSLATIONS, &c. AND AN ADDITIONAL APPENDIX.

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The present copy of Stewart's *Elements of the Philosophy of the Human Mind*, is printed from a late English edition. This contains some additions and corrections by the author; especially an Appendix to the second volume. After the printing of the first volume had commenced, it occurred to the publishers, that a translation of the Greek, Latin, and French quotations would be acceptable to many readers. This has been executed with great care and fidelity, and it is hoped will give satisfaction. The translation of the notes of the *first* volume will be found at page 315, at the end of the Notes and Illustrations of the said volume. The whole work has been carefully revised.

Boston, September, 1821.

TO

THE REVEREND

THOMAS REID, D. D.

PROFESSOR OF MORAL PHILOSOPHY

IN THE UNIVERSITY OF GLASGOW,

THIS WORK

IS INSCRIBED,

IN TESTIMONY OF

THE RESPECT AND AFFECTION

OF

THE AUTHOR.

ADVERTISEMENT.

IN various parts of the following Work, references are made to subsequent speculations, which are not contained in it. These speculations it is my intention to resume at some future period: but when I consider the extent of my subject, and the many accidents which may divert me from the prosecution of it, I cannot venture so far as to announce, in the title-page of this volume, any promise of a future publication.

Some additional chapters are still wanting, to complete the analysis of the Intellectual Powers. After finishing this, the course of my inquiries would lead me *to treat*, in the second place, of Man considered as an Active and Moral being; and, thirdly, of Man considered as the member of a Political Society.

COLLEGE OF EDINBURGH,
March 13, 1792.

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ELEMENTS

OF THE

PHILOSOPHY OF THE HUMAN MIND.

INTRODUCTION.

PART I.

Of the Nature and Object of the Philosophy of the Human Mind.

THE prejudice which is commonly entertained against metaphysical speculations, seems to arise chiefly from two causes: First, from an apprehension that the subjects about which they are employed are placed beyond the reach of the human faculties; and, secondly, from a belief that these subjects have no relation to the business of life.

The frivolous and absurd discussions which abound in the writings *of most* metaphysical authors, afford but too many arguments in justification of these opinions; and if such discussions were to be admitted as a fair specimen of what the human mind is able to accomplish in this department of science, the contempt, into which it has fallen of late, might with justice be regarded, as no inconsiderable evidence of the progress which true philosophy has made in the present age. Among the various subjects of inquiry, however, which, in consequence of the vague use of language, are comprehended under the general title of Metaphysics, there are some, which are essentially distinguished from the rest, both by the degree of evidence which accompanies their principles, and by the relation which they bear to the useful sciences and arts: and it has unfortunately happened, that these have shared in that general discredit, into which the other branches of metaphysics have justly fallen. To this circumstance is probably to be ascribed, the little progress which has hitherto been made in the PHILOSOPHY OF THE HUMAN MIND; a science, so interesting in its nature, and so important in its applications, that it could scarcely have failed, in these inquisitive and enlightened times, to have excited a very general attention, if it had not accidentally been classed, in the public opinion, with the vain and unprofitable disquisitions of the schoolmen.

In order to obviate these misapprehensions with respect to the subject of the following work, I have thought it proper, in this preliminary chapter, first, to explain the nature of the truths which I propose to investigate; and, secondly, to point out some of the more important applications of which they are susceptible. In stating these preliminary observations, I may perhaps appear to some to be minute and tedious; but this fault, I am confident, will be readily pardoned by those, who have studied with care the principles of that science of which I am to treat: and who are anxious to remove the prejudices which have, in a great measure, excluded it from the modern systems of education. In the progress of my work, I flatter myself that I shall not often have occasion to solicit the indulgence of my readers, for an unnecessary diffuseness.

The notions we annex to the words, Matter, and Mind, as is well remarked by Dr. Reid,* are merely relative. If I am asked, what I mean by matter? I can only explain myself by saying, it is that which is extended, figured, coloured, moveable, hard or soft, rough or smooth, hot or cold,—that is, I can define it in no other way, than by enumerating its sensible qualities. It is not matter, or body, which I perceive by my senses; but only extension, figure, colour, and certain other qualities, which the constitution of my nature leads me to refer to something, which is extended, figured, and coloured. The case is precisely similar with respect to Mind. We are not immediately conscious of its existence, but we are conscious of sensation, thought, and volition; operations, which imply the existence of something which feels, thinks, and wills. Every man too is impressed with an irresistible conviction, that all these sensations, thoughts, and volitions belong to one and the same being; to that being, which he calls *himself;* a being, which he is led, by the constitution of his nature, to consider as something distinct from his body, and as not liable to be impaired by the loss or mutilation of any of his organs.

From these considerations, it appears, that we have the same evidence for the existence of mind, that we have for the existence of body; nay, if there be any difference between the two cases, that we have stronger evidence for it; inasmuch as the one is suggested to us by the subjects of our own consciousness, and the other merely by the objects of our own perceptions: and in this light, undoubtedly, the fact would appear to every person, were it not, that, from our earliest years, the attention is engrossed with the qualities and laws of matter, an acquaintance with which is absolutely necessary for the preservation of our animal existence. Hence it is, that these phenomena occupy our thoughts more than those of mind: that we are perpetually tempted to explain the latter by the analogy of the former, and even to endeavour to refer them to the same general laws; and that we acquire habits of inattention to the subjects of our consciousness, too strong to be afterwards surmounted, without the most persevering industry.

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* Essays on the Active Powers of Man, p. 8, 9.

If the foregoing observations be well founded, they establish the distinction between mind and matter, without any long process of metaphysical reasoning:* for if our notions of both are merely relative; if we know the one, only by such sensible qualities as extension, figure, and solidity; and the other, by such operations as sensation, thought, and volition; we are certainly entitled to say, that matter and mind, considered as objects of human study, are essentially different; the science of the former resting ultimately on the phenomena exhibited to our senses; that of the latter, on the phenomena of which we are conscious. Instead, therefore, of objecting to the scheme of materialism, that its conclusions are false, it would be more accurate to say, that its aim is unphilosophical. It proceeds on a misapprehension of the proper object of science; the difficulty which it professes to remove being manifestly placed beyond the reach of our faculties. Surely, when we attempt to explain the nature of that principle which feels and thinks and wills, by saying, that it is a material substance, or that it is the result of material organization, we impose on ourselves by words—forgetting, that matter as well as mind is known to us by its qualities and attributes alone, and that we are totally ignorant of the essence of either.†

As all our knowledge of the material world is derived from the information of our senses, natural philosophers have, in modern times, wisely abandoned to metaphysicians all speculations concerning the nature of that substance of which it is composed; concerning the possibility or impossibility of its being created; concerning the *efficient causes* of the changes which take place in it; and even concerning the reality of its existence, independent of that of percipient beings: and have confined themselves to the humbler province of observing the phenomena it exhibits, and of ascertaining their general laws. By pursuing this plan steadily, they have, in the course of the two last centuries, formed a body of science, which not only does honour to the human understanding, but has had a most important influence on the practical arts of life. This experimental philosophy no one now is in danger of confounding with the metaphysical speculations already mentioned. Of the importance of these, as a separate branch of study, it is possible that some may think more favourably than others; but they are obviously different in their nature from the investigations of physics; and it is of the utmost consequence to the evidence of this last science, that its principles should not be blended with those of the former.

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* See Note [A.] at the end of the volume.

† Some Metaphysicians, who appear to admit the truth of the foregoing reasoning, have farther urged, that for any thing we can prove to the contrary, it is possible, that the unknown substance which has the qualities of extension, figure, and colour, may be the same with the unknown substance which has the attributes of feeling, thinking and willing. But besides that this is only an hypothesis, which amounts to nothing more than a mere possibility, even if it were true, it would no more be proper to say of mind, that it is material, than to say of body, that it is spiritual.

A similar distinction takes place among the questions which may be stated relative to the human mind.—Whether it be extended or unextended: whether or not it has any relation to place; and (if it has) whether it resides in the brain, or be spread over the body, by diffusion; are questions perfectly analogous to those which metaphysicians have started on the subject of matter. It is unnecessary to inquire, at present, whether or not they admit of answer. It is sufficient for my purpose to remark, that they are as widely and obviously different from the view which I propose to take of the human mind, in the following work, as the reveries of Berkeley concerning the non-existence of the material world, are from the conclusions of Newton, and his followers.—It is farther evident, that the metaphysical opinions, which we may happen to have formed concerning the nature either of body or of mind, and the efficient causes by which their phenomena are produced, have no necessary connexion with our inquiries concerning the laws, according to which these phenomena take place.—Whether (for example) the cause of gravitation be material or immaterial, is a point about which two Newtonians may differ, while they agree perfectly in their physical opinions. It is sufficient, if both admit the general fact, that bodies tend to approach each other, with a force varying with their mutual distance, according to a certain law. In like manner, in the study of the human mind, the conclusions to which we are led, by a careful examination of the phenomena it exhibits, have no necessary connexion with our opinions concerning its nature and essence.—That when two subjects of thought, for instance, have been repeatedly presented to the mind in conjunction, the one has a tendency to suggest the other, is a fact of which I can no more doubt, than of any thing for which I have the evidence of my senses; and it is plainly a fact totally unconnected with any hypothesis concerning the nature of the soul, and which will be as readily admitted by the materialist as by the Berkeleian.

Notwithstanding, however, the reality and importance of this distinction, it has not hitherto been sufficiently attended to, by the philosophers who have treated of the human mind. Dr. Reid is perhaps the only one who has perceived it clearly, or at least who has kept it steadily in view, in all his inquiries. In the writings, indeed, of several other modern metaphysicians, we meet with a variety of important and well ascertained facts; but, in general, these facts are blended with speculations upon subjects which are placed beyond the reach of human faculties.—It is this mixture of fact and of hypothesis, which has brought the philosophy of mind into some degree of discredit; nor will ever its real value be generally acknowledged, till the distinction, I have endeavoured to illustrate, be understood, and attended to, by those who speculate on the subject. By confining their attention to the sensible qualities of body, and to the sensible phenomena it exhibits, we know what discoveries natural philosophers have made: and if the labours of Metaphysicians shall ever be rewarded with similar success, it can only be, by attentive and patient reflection on the subjects of their own consciousness.

I cannot help taking this opportunity of remarking, on the other hand, that if physical inquirers should think of again employing themselves in speculations about the nature of matter, instead of attempting to ascertain its sensible properties and laws, (and of late there seems to be such a tendency among some of the followers of Boscovich,) they will soon involve themselves in an inextricable labyrinth, and the first principles of physics will be rendered as mysterious and chimerical, as the pneumatology of the schoolmen.

The little progress which has hitherto been made in the philosophy of mind, will not appear surprising to those who have attended to the history of natural knowledge. It is only since the time of Lord Bacon, that the study of it has been prosecuted with any degree of success, or that the proper method of conducting it has been generally understood. There is even some reason for doubting, from the crude speculations on medical and chemical subjects which are daily offered to the public, whether it be yet understood so completely as is commonly imagined; and whether a fuller illustration of the rules of philosophizing, than Bacon or his followers have given, might not be useful, even to physical inquirers.

When we reflect, in this manner, on the shortness of the period during which natural philosophy has been successfully cultivated; and, at the same time, consider how open to our examination the laws of matter are, in comparison of those which regulate the phenomena of thought, we shall neither be disposed to wonder, that the philosophy of mind should still remain in its infancy, nor be discouraged in our hopes concerning its future progress. The excellent models of this species of investigation, which the writings of Dr. Reid exhibit, give us ground to expect that the time is not far distant, when it shall assume that rank which it is entitled to hold among the sciences.

It would probably contribute much to accelerate the progress of the philosophy of mind, if a distinct explanation were given of its nature and object; and if some general rules were laid down, with respect to the proper method of conducting the study of it. To this subject, however, which is of sufficient extent to furnish matter for a separate work, I cannot attempt to do justice at present; and shall therefore confine myself to the illustration of a few fundamental principles, which it will be of essential importance for us to keep in view in the following inquiries.

Upon a slight attention to the operations of our own minds, they appear to be so complicated, and so infinitely diversified, that it seems to be impossible to reduce them to any general laws. In consequence, however, of a more accurate examination, the prospect clears up; and the phenomena, which appeared, at first, to be too various for our comprehension, are found to be the result of a comparatively small number of simple and uncompounded faculties, or of simple and uncompounded principles of action. These faculties and principles are the general laws of our constitution, and hold the same place in the philosophy of mind, that the general laws we investigate in physics, hold in that branch of science. In both cases, the laws which nature has established, are to be investigated only by an examination of facts; and in both cases, a knowledge of these laws leads to an explanation of an infinite number of phenomena.

In the investigation of physical laws, it is well known, that our inquiries must always terminate in some general fact, of which no account can be given, but that such is the constitution of nature. After we have established, for example, from the astronomical phenomena, the universality of the law of gravitation, it may still be asked, whether this law implies the constant agency of mind; and (upon the supposition that it does) whether it be probable that the Deity always operates immediately, or by means of subordinate instruments! but these questions, however curious, do not fall under the province of the natural philosopher. It is sufficient for his purpose, if the universality of the fact be admitted.

The case is exactly the same in the philosophy of mind. When we have once ascertained a general fact; such as, the various laws which regulate the association of ideas, or the dependence of Memory on that effort of the mind which we call Attention; it is all we ought to aim at in this branch of science. If we proceed no farther than facts for which we have the evidence of our own consciousness, our conclusions will be no less certain, than those in physicks: but if our curiosity leads us to attempt an explanation of the association of ideas, by certain supposed vibrations, or other changes, in the state of the brain; or to explain memory, by means of supposed impressions and traces in the sensorium; we evidently blend a collection of important and well ascertained truths, with principles which rest wholly on conjecture.[*]

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[*] There is indeed one view of the connexion between Mind and Matter, which is perfectly agreeable to the just rules of philosophy. The object of this is, to ascertain the laws which regulate their union, without attempting to explain in what manner they are united.

Lord Bacon was, I believe, the first who gave a distinct idea of this sort of speculation; and I do not know that much progress has yet been made in it. In his books de Augmentis Scientiarum, a variety of subjects are enumerated, in order to illustrate its nature; and, undoubtedly, most of these are in a high degree curious and important. The following list comprehends the chief of those he has mentioned; with the addition of several others, recommended to the consideration of Philosophers and of Medical Inquirers, by the late Dr. Gregory. See his Lectures on the Duties and Qualifications of a Physician.

1. The doctrine of the preservation and improvement of the different senses.
2. The history of the power and influence of imagination.
3. The history of the several species of enthusiasm.
4. The history of the various circumstances in parents, that have an influence on conception, and on the constitution and characters of their children.
5. The history of dreams.
6. The history of the laws of custom and habit.
7. The history of the effects of musick, and of such other things as operate on the mind and body, in consequence of impressions made on the senses.

The observations which have been now stated, with respect to the proper limits of philosophical curiosity, have too frequently escaped the attention of speculative men, in all the different departments of science. In none of these, however, has this inattention produced such a variety of errours and absurdities, as in the science of mind; a subject to which, till of late, it does not seem to have been suspected, that the general rules of philosophizing are applicable. The strange mixture of fact and hypothesis, which the greater part of metaphysical inquiries exhibit, had led almost universally to a belief, that it is only a very faint and doubtful light, which human reason can ever expect to throw on this dark, but interesting, field of speculation.

Besides this inattention to the proper limits of philosophical inquiry, other sources of errour, from which the science of physics is entirely exempted, have contributed to retard the progress of the philosophy of mind. Of these, the most important proceed from that disposition, which is so natural to every person at the commencement of his philosophical pursuits, to explain intellectual and moral phenomena by the analogy of the material world.

I before took notice of those habits of inattention to the subjects of our consciousness, which take their rise in that period of our lives, when we are necessarily employed in acquiring a knowledge of the properties and laws of matter. In consequence of this early familiarity with the phenomena of the material world, they appear to us less mysterious than those of mind; and we are apt to think that we have advanced one step in explaining the latter, when we can point out some analogy between them and the former. It is owing to the same circumstance, that we have scarcely any appropriated language with respect to mind, and that the words, which express its different operations, are almost all borrowed from the objects of our senses. It must, however, appear manifest, upon a very little reflection, that as the two subjects are essentially distinct, and as each of them has its peculiar laws, the analogies we are pleased to fancy between them, can be of no use in illustrating either; and that it is no less unphilosophical to attempt an explanation of perception, or of the association of ideas, upon mechanical principles, than it would be to explain the phenomena of gravitation, by supposing, as some of the ancients did, the particles of matter to be animated with principles of motion; or to explain the

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8. The history of natural signs and language, comprehending the doctrine of physiognomy and of outward gesture.

9. The history of the power and laws of the principle of imitation.

To this list various other subjects might be added; particularly, the history of the laws of memory, in so far as they appear to be connected with the state of the body; and the history of the different species of madness.

This view of the connexion between Mind and Matter does not fall properly under the plan of the following work; in which my leading object is to ascertain the principles of our nature, in so far as they can be discovered by attention to the subjects of our own consciousness; and to apply these principles to explain the phenomena arising from them. Various incidental remarks, however, will occur in the course of our inquiries, tending to illustrate some of the subjects comprehended in the foregoing enumeration.

chemical phenomena of elective attractions, by supposing the substances among which they are observed, to be endowed with thought and volition.—The analogy of matter, therefore, can be of no use in the inquiries which form the object of the following work; but, on the contrary, is to be guarded against, as one of the principal sources of the errours to which we are liable.

Among the different philosophers who have speculated concerning the human mind, very few indeed can be mentioned, who have at all times been able to guard against analogical theories. At the same time, it must be acknowledged, that since the publication of Des Cartes' writings, there has been a gradual, and, on the whole, a very remarkable improvement in this branch of science. One striking proof of this is, the contrast between the metaphysical speculations of some of the most eminent philosophers in England at the end of the last century, and those which we find in the systems, however imperfect, of the present age. Would any writer now offer to the world such conclusions with respect to the mind, as are contained in the two following passages from Locke and Newton? "Habits," (says Locke,) "seem to be but trains of motion, in the "animal spirits, which, once set a-going, continue in the same steps "they had been used to, which, by often treading, are worn into a "smooth path." And Newton himself has proposed the following query, concerning the manner in which the mind perceives external objects. "Is not, (says he,) the sensorium of animals the place "where the sentient substance is present, and to which the sensible "species of things are brought, through the nerves and brain, that "they may be perceived by the mind present in that place?"—In the course of the following Essays, I shall have occasion to quote various other passages from later writers, in which an attempt is made to explain the other phenomena of mind upon similar principles.

It is however much to be regretted, that even since the period when philosophers began to adopt a more rational plan of inquiry with respect to such subjects, they have been obliged to spend so much of their time in clearing away the rubbish collected by their predecessors. This indeed was a preliminary step, which the state of the science, and the conclusions to which it had led, rendered absolutely necessary; for, however important the positive advantages may be, which are to be expected from its future progress, they are by no means so essential to human improvement and happiness, as a satisfactory refutation of that sceptical philosophy, which had struck at the root of all knowledge and all belief. Such a refutation seems to have been the principal object which Dr. Reid proposed to himself in his metaphysical inquiries; and to this object his labours have been directed with so much ability, candour, and perseverance, that unless future sceptics should occupy a ground very different from that of their predecessors, it is not likely that the controversy will ever be renewed. The rubbish being now removed, and the foundations laid, it is time to begin the superstructure. The progress which I have made in it is, I am sensible, very inconsiderable; yet I flatter myself, that the little I have done, will be sufficient to illustrate the importance of the study, and to recommend the subjects, of which I am to treat, to the attention of others.

After the remarks which I have now made, the reader will not be surprised to find, that I have studiously avoided the consideration of those questions which have been agitated in the present age, between the patrons of the sceptical philosophy, and their opponents. These controversies have, in truth, no peculiar connexion with the inquiries on which I am to enter. It is indeed only by an examination of the principles of our nature, that they can be brought to a satisfactory conclusion; but supposing them to remain undecided, our sceptical doubts concerning the certainty of human knowledge, would no more affect the philosophy of mind, than they would affect any of the branches of physics; nor would our doubts concerning even the existence of mind, affect this branch of science, any more than the doubts of the Berkeleian, concerning the existence of matter, affect his opinions in natural philosophy.

To what purposes the Philosophy of the human mind, according to the view which I propose to take of it, is subservient, I shall endeavour to explain, at some length, in the following section.

PART SECOND.

SECTION I.

Of the Utility of the Philosophy of the Human Mind.

It has been often remarked, that there is a mutual connexion between the different arts and sciences; and that the improvements which are made in one branch of human knowledge, frequently throw light on others, to which it has apparently a very remote relation. The modern discoveries in astronomy, and in pure mathematics, have contributed to bring the art of navigation to a degree of perfection formerly unknown. The rapid progress which has been lately made in astronomy, anatomy, and botany has been chiefly owing to the aid which these sciences have received from the art of the optician.

Although, however, the different departments of science and of art mutually reflect light on each other, it is not always necessary either for the philosopher or the artist to aim at the acquisition of general knowledge. Both of them may safely take many principles for granted, without being able to demonstrate their truth. A seaman.

though ignorant of mathematics, may apply, with correctness and dexterity, the rules for finding the longitude: An astronomer, or a botanist, though ignorant of optics, may avail himself of the use of the telescope, or the microscope.

These observations are daily exemplified in the case of the artist; who has seldom either inclination or leisure to speculate concerning the principles of his art. It is rarely, however, we meet with a man of science, who has confined his studies wholly to one branch of knowledge. That curiosity which he has been accustomed to indulge in the course of his favourite pursuit, will naturally extend itself to every remarkable object which falls under his observation; and can scarcely fail to be a source of perpetual dissatisfaction to his mind, till it has been so far gratified as to enable him to explain all the various phenomena, which his professional habits are every day presenting to his view.

As every particular science is in this manner connected with others, to which it naturally directs the attention, so all the pursuits of life, whether they terminate in speculation or action, are connected with that general science, which has the human mind for its object. The powers of the understanding are instruments which all men employ; and his curiosity must be small indeed, who passes through life in a total ignorance of faculties, which his wants and necessities force him habitually to exercise, and which so remarkably distinguish man from the lower animals. The active principles of our nature, which, by their various modifications and combinations, give rise to all the moral differences among men, are fitted, in a still higher degree, if possible, to interest those, who are either disposed to reflect on their own characters, or to observe, with attention, the characters of others. The phenomena resulting from these faculties and principles of the mind, are every moment soliciting our notice; and open to our examination a field of discovery, as inexhaustible as the phenomena of the material world, and exhibiting not less striking marks of divine wisdom.

While all the sciences, and all the pursuits of life, have this common tendency to lead our inquiries to the philosophy of human nature, this last branch of knowledge borrows its principles from no other science whatever. Hence there is something in the study of it, which is peculiarly gratifying to a reflecting and inquisitive mind; and something in the conclusions to which it leads, on which the mind rests with peculiar satisfaction. Till once our opinions are in some degree fixed with respect to it, we abandon ourselves, with reluctance, to particular scientific investigations; and on the other hand, a general knowledge of such of its principles as are most fitted to excite the curiosity, not only prepares us for engaging in other pursuits with more liberal and comprehensive views, but leaves us at liberty to prosecute them with a more undivided and concentrated attention.

It is not, however, merely as a subject of speculative curiosity, that the principles of the human mind deserve a careful examination. The advantages to be expected from a successful analysis of it are various; and some of them of such importance, as to render it astonishing, that, amidst all the success with which the subordinate sciences have been cultivated, this, which comprehends the principles of all of them, should be still suffered to remain in its infancy.

I shall endeavour to illustrate a few of these advantages, beginning with what appears to me to be the most important of any; the light, which a philosophical analysis of the principles of the mind would necessarily throw on the subjects of intellectual and moral education.

The most essential objects of education are the two following: First, to cultivate all the various principles of our nature, both speculative and active, in such a manner as to bring them to the greatest perfection of which they are susceptible; and, Secondly, by watching over the impressions and associations which the mind receives in early life, to secure it against the influence of prevailing errors; and, as far as possible, to engage its prepossessions on the side of truth. It is only upon a philosophical analysis of the mind, that a systematical plan can be founded, for the accomplishment of either of these purposes.

There are few individuals, whose education has been conducted in every respect with attention and judgment. Almost every man of reflection is conscious, when he arrives at maturity, of many defects in his mental powers; and of many inconvenient habits, which might have been prevented or remedied in his infancy or youth. Such a consciousness is the first step towards improvement; and the person who feels it, if he is possessed of resolution and steadiness, will not scruple to begin, even in advanced years, a new course of education for himself. The degree of reflection and observation, indeed, which is necessary for this purpose, cannot be expected from any one at a very early period of life, as these are the last powers of the mind which unfold themselves; but it is never too late to think of the improvement of our faculties; and much progress may be made, in the art of applying them successfully to their proper objects, or in obviating the inconveniences resulting from their imperfection, not only in manhood, but in old age.

It is not, however, to the mistakes of our early instructers, that all our intellectual defects are to be ascribed. There is no profession or pursuit which has not habits peculiar to itself; and which does not leave some powers of the mind dormant, while it exercises and improves the rest. If we wish, therefore, to cultivate the mind to the extent of its capacity, we must not rest satisfied with that employment which its faculties receive from our particular situation in life. It is not in the awkward and professional form of a mechanic, who has strengthened particular muscles of his body by the habits of his trade, that we are to look for the perfection of our animal nature: neither is it among men of confined pursuits, whether speculative or active, that we are to expect to find the human mind in its highest state of cultivation. A variety of exercises is necessary to preserve the animal frame in vigour and beauty; and a variety of those occupations which literature and science afford, added to a promiscuous intercourse with the world, in the habits of conversation and business, is no less necessary for the improvement of the understanding. I acknowledge, that there are some professions, in which a man of very confined acquisitions may arrive at the first eminence; and in which he will perhaps be the more likely to excel, the more he has concentrated the whole force of his mind to one particular object. But such a person, however distinguished in his own sphere, is educated merely to be a literary artisan; and attains neither the perfection, nor the happiness of his nature. "That education only can be considered as complete and generous, "which" (in the language of Milton), "fits a man to perform justly, "skilfully and magnanimously, all the offices, both private and pub-"lic, of peace, and of war."*

I hope it will not be supposed, from the foregoing observations, that they are meant to recommend an indiscriminate attention to all the objects of speculation and of action. Nothing can be more evident, than the necessity of limiting the field of our exertion, if we wish to benefit society by our labours. But it is perfectly consistent with the most intense application to our favourite pursuit, to cultivate that general acquaintance with letters and with the world, which may be sufficient to enlarge the mind, and to preserve it from any danger of contracting the pedantry of a particular profession. In many cases, (as was already remarked,) the sciences reflect light on each other; and the general acquisitions which we have made in other pursuits, may furnish us with useful helps for the farther prosecution of our own. But even in those instances in which the case is otherwise, and in which these liberal accomplishments must be purchased by the sacrifice of a part of our professional eminence, the acquisition of them will amply repay any loss we may sustain. It ought not to be the leading object of any one, to become an eminent metaphysician, mathematician, or poet; but to render himself happy as an individual, and an agreeable, a respectable, and an useful member of society. A man who loses his sight, improves the sensibility of his touch; but who would consent, for such a recompense, to part with the pleasures which he receives from the eye?

It is almost unnecessary for me to remark, how much individuals would be assisted in the proper and liberal culture of the mind, if they were previously led to take a comprehensive survey of human nature in all its parts; of its various faculties, and powers, and sources of enjoyment; and of the effects which are produced on these principles by particular situations. It is such a knowledge alone of the capacities of the mind, that can enable a person to judge of his own acquisitions; and to employ the most effectual means for supplying his defects, and removing his inconvenient habits. Without some degree of it, every man is in danger of contracting bad habits, before he is aware; and of suffering some of his powers to go to decay, for want of proper exercise.

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* Tractate of Education.

If the business of early education were more thoroughly, and more generally, understood, it would be less necessary for individuals, when they arrive at maturity, to form plans of improvement for themselves. But education never can be systematically directed to its proper objects, till we have obtained, not only an accurate analysis of the general principles of our nature, and an account of the most important laws which regulate their operation; but an explanation of the various modifications and combinations of these principles which produce that diversity of talents, genius, and character, we observe among men. To instruct youth in the languages, and in the sciences, is comparatively of little importance, if we are inattentive to the habits they acquire; and are not careful in giving, to all their different faculties, and all their different principles of action, a proper degree of employment. Abstracting entirely from the culture of their moral powers, how extensive and difficult is the business of conducting their intellectual improvement! To watch over the associations which they form in their tender years; to give them early habits of mental activity; to rouse their curiosity, and to direct it to proper objects; to exercise their ingenuity and invention; to cultivate in their minds a turn for speculation, and at the same time preserve their attention alive to the objects around them; to awaken their sensibilities to the beauties of nature, and to inspire them with a relish for intellectual enjoyment,—these form but a part of the business of education; and yet the execution even of this part requires an acquaintance with the general principles of our nature, which seldom falls to the share of those to whom the instruction of youth is commonly intrusted.—Nor will such a theoretical knowledge of the human mind, as I have now described, be always sufficient in practice. An uncommon degree of sagacity is frequently requisite, in order to accommodate general rules to particular tempers, and characters.—In whatever way we choose to account for it, whether by original organization, or by the operation of moral causes in very early infancy; no fact can be more undeniable, than that there are important differences discernible in the minds of children, previous to that period at which, in general, their intellectual education commences. There is, too, a certain hereditary character (whether resulting from physical constitution, or caught from imitation and the influence of situation,) which appears remarkably in particular families. One race, for a succession of generations, is distinguished by a genius for the abstract sciences, while it is deficient in vivacity, in imagination, and in taste: another is no less distinguished for wit, and gayety, and fancy; while it appears incapable of patient attention, or of profound research. The system of education which is proper to be adopted in particular cases, ought, undoubtedly, to have some reference to these circumstances; and to be calculated, as much as possible, to develope and to cherish those intellectual and active principles, in which a natural deficiency is most to be apprehended. Montesquieu, and other speculative politicians, have insisted much on the reference which education and laws should have to climate. I shall not take upon me to say, how far their conclusions on this subject are just; but I am fully persuaded, that there is a foundation in philosophy and good sense, for accommodating, at a very early period of life, the education of individuals to those particular turns of mind, to which, from hereditary propensities, or from moral situation, they may be presumed to have a natural tendency.

There are few subjects more hackneyed than that of education; and yet there is none, upon which the opinions of the world are still more divided. Nor is this surprising; for most of those who have speculated concerning it, have confined their attention chiefly to incidental questions about the comparative advantages of public or private instruction, or the utility of particular languages or sciences; without attempting a previous examination of those faculties and principles of the mind, which it is the great object of education to improve. Many excellent detached observations, indeed, both on the intellectual and moral powers, are to be collected from the writings of ancient and modern authors; but I do not know, that, in any language, an attempt has been made to analyze and illustrate the principles of human nature, in order to lay a philosophical foundation for their proper culture.

I have even heard some very ingenious and intelligent men dispute the propriety of so systematical a plan of instruction. The most successful and splendid exertions, both in the sciences and arts, (it has been frequently remarked,) have been made by individuals, in whose minds the seeds of genius were allowed to shoot up, wild and free; while, from the most careful and skilful tuition, seldom any thing results above mediocrity. I shall not, at present, enter into any discussions with respect to the certainty of the fact on which this opinion is founded. Supposing the fact to be completely established, it must still be remembered, that originality of genius does not always imply vigour and comprehensiveness and liberality of mind; and that it is desirable only, in so far as it is compatible with these more valuable qualities. I already hinted, that there are some pursuits, in which, as they require the exertion only of a small number of our faculties, an individual, who has a natural turn for them, will be more likely to distinguish himself, by being suffered to follow his original bias, than if his attention were distracted by a more liberal course of study. But wherever such men are to be found, they must be considered, on the most favourable supposition, as having sacrificed, to a certain degree, the perfection and the happiness of their nature, to the amusement or instruction of others. It is too in times of general darkness and barbarism, that what is commonly called originality of genius most frequently appears: and surely the great aim of an enlightened and benevolent philosophy, is not to rear a small number of individuals, who may be regarded as prodigies in an ignorant and admiring age, but to diffuse, as widely as possible, that degree of cultivation which may enable the bulk of a people to possess all the intellectual and moral improvement of which their nature is susceptible. "Original genius" (says Voltaire) "occurs but seldom in a nation where the literary taste is formed. The number of cultivated minds which there abound, like the "trees in a thick and flourishing forest, prevent any single individual from rearing his head far above the rest. Where trade is in "few hands, we meet with a small number of overgrown fortunes "in the midst of a general poverty: in proportion as it extends, "opulence becomes general, and great fortunes rare. It is, precisely, because there is at present much light, and much cultivation in France, that we are led to complain of the want of superiour genius."

To what purpose, indeed, it may be said, all this labour? Is not the importance of every thing to man, to be ultimately estimated by its tendency to promote his happiness? And is not our daily experience sufficient to convince us, that this is, in general, by no means proportionate to the culture which his nature has received?—Nay, is there not some ground for suspecting, that the lower orders of men enjoy, on the whole, a more enviable condition, than their more enlightened and refined superiours?

The truth, I apprehend, is, that happiness, in so far as it arises from the mind itself, will be always proportioned to the degree of perfection which its powers have attained; but that, in cultivating these powers, with a view to this most important of all objects, it is essentially necessary that such a degree of attention be bestowed on all of them, as may preserve them in that state of relative strength, which appears to be agreeable to the intentions of nature. In consequence of an exclusive attention to the culture of the imagination, the taste, the reasoning faculty, or any of the active principles, *it is possible that the pleasures of human life may be diminished, or its pains increased; but the inconveniences which are* experienced in such cases, are not to be ascribed to education, but to a partial and injudicious education. In such cases, it is possible, that the poet, the metaphysician, or the man of taste and refinement, may appear to disadvantage, when compared with the vulgar; for such is the benevolent appointment of Providence with respect to the lower orders, that, although not one principle of their nature be completely unfolded, the whole of these principles preserve among themselves that balance, which is favourable to the tranquillity of their minds, and to a prudent and steady conduct in the limited sphere which is assigned to them, far more completely, than in those of their superiours, whose education has been conducted on an erroneous or imperfect system: but all this, far from weakening the force of the foregoing observations, only serves to demonstrate, how impossible it always will be, to form a rational plan for the improvement of the mind, without an accurate and comprehensive knowledge of the principles of the human constitution.

The remarks which have been already made, are sufficient to illustrate the dangerous consequences, which are likely to result from a partial and injudicious cultivation of the mind; and, at the same time, to point out the utility of the intellectual philosophy, in enabling us to preserve a proper balance among all its various faculties, principles of action and capacities of enjoyment. Many additional observations might be offered, on the tendency, which an accurate analysis of its powers might probably have, to suggest rules for their farther improvement, and for a more successful application of them to their proper purposes: but this subject I shall not prosecute at present, as the illustration of it is one of the leading objects of the following work.—That the memory, the imagination, or the reasoning faculty, are to be instantly strengthened in consequence of our speculations concerning their nature, it would be absurd to suppose; but it is surely far from being unreasonable to think, that an acquaintance with the laws which regulate these powers, may suggest some useful rules for their gradual cultivation, for remedying their defects in the case of individuals, and even for extending those limits, which nature seems, at first view, to have assigned them.

To how great a degree of perfection the intellectual and moral nature of man is capable of being raised by cultivation, it is difficult to conceive. The effects of early, continued, and systematical education, in the case of those children who are trained, for the sake of gain, to feats of strength and agility, justify, perhaps, the most sanguine views which it is possible for a philosopher to form, with respect to the improvement of the species.

I now proceed to consider, how far the philosophy of mind may be useful in accomplishing the second object of education; by assisting us in the management of early impressions and associations.

By far the greater part of the opinions on which we act in life, are not the result of our own investigations; but are adopted implicitly, in infancy and youth, upon the authority of others. Even the great principles of morality, although implanted in every heart, are commonly aided and cherished, at least to a certain degree, by the care of our instructers.—All this is undoubtedly agreeable to the intentions of nature; and, indeed, were the case otherwise, society could not subsist; for nothing can be more evident, than that the bulk of mankind, condemned as they are to laborious occupations which are incompatible with intellectual improvement, are perfectly incapable of forming their own opinions on some of the most important subjects that can employ the human mind. It is evident, at the same time, that as no system of education is perfect, a variety of prejudices must in this way take an early hold of our belief; so as to acquire over it an influence not inferiour to that of the most incontrovertible truths. When a child hears, either a speculative absurdity, or an erroneous principle of action, recommended and enforced daily, by the same voice which first conveyed to it those simple and sublime lessons of morality and religion which are congenial to its nature, is it to be wondered at, that, in future life, it should find it so difficult to eradicate prejudices which have twined their roots with all the essential principles of the human frame? —If such, however, be the obvious intentions of nature, with respect to those orders of men who are employed in bodily labour, it is equally clear, that she meant to impose it as a double obligation on those who receive the advantages of a liberal education, to examine, with the most scrupulous care, the foundation of all those received opinions, which have any connexion with morality, or with human happiness. If the multitude must be led, it is of consequence, surely, that it should be led by enlightened conductors; by men who are able to distinguish truth from errour; and to draw the line between those prejudices which are innocent or salutary, (if indeed there are any prejudices which are really salutary,) and those which are hostile to the interests of virtue and of mankind.

In such a state of society as that in which we live, the prejudices of a moral, a political, and a religious nature, which we imbibe in early life, are so various, and at the same time so intimately blended with the belief we entertain of the most sacred and important truths, that a great part of the life of a philosopher must necessarily be devoted, not so much to the acquisition of new knowledge, as to unlearn the errours, to which he had been taught to give an implicit assent, before the dawn of reason and reflection. And unless he submit in this manner to bring all his opinions to the test of a severe examination, his ingenuity, and his learning, instead of enlightening the world, will only enable him to give an additional currency, and an additional authority, to establish errours. To attempt such a struggle against early prejudices, is, indeed, the professed aim of all philosophers; but how few are to be found who have force of mind sufficient for accomplishing their object; and who, in freeing themselves from one set of errours, do not allow themselves to be carried away with another? To succeed in it completely, Lord Bacon seems to have thought, (in one of the most remarkable passages of his writings,) to be more than can well be expected from human frailty. —"Nemo adhuc tanta mentis constantia inventus est, ut decreverit, "et sibi imposuerit, theorias et notiones communes penitus abolere, "et intellectum abrasum et aequum ad particularia de integro ap-"plicare. Itaque illa ratio humana, quam habemus, ex multa fide, "et multo etiam casu, nec non ex puerilibus, quas primo hausimus, "notionibus, farrago quaedam est et congeries. Quod siquis, aetate "matura, et sensibus integris, et mente repurgata, se ad experi-"entiam, et ad particularia de integro applicet, de eo melius spe-"randum est."

Nor is it merely in order to free the mind from the influence of errour, that it is useful to examine the foundation of established opinions. It is such an examination alone, that, in an inquisitive age like the present, can secure a philosopher from the danger of unlimited scepticism. To this extreme, indeed, the complexion of the times is more likely to give him a tendency, than to implicit credulity. In the former ages of ignorance and superstition, the intimate association which had been formed, in the prevailing systems of education, between truth and errour, had given to the latter an ascendant over the minds of men, which it could never have acquired, if divested of such an alliance. The case has, of late years, been most remarkably reversed: the common sense of mankind, in consequence of the growth of a more liberal spirit of inquiry, has revolted against many of those absurdities, which had so long held human reason in captivity; and it was, perhaps, more than could reasonably have been expected, that, in the first moments of their emancipation, philosophers should have stopped short, at the precise boundary, which cooler reflection, and more moderate views, would have prescribed. The fact is, that they have passed far beyond it; and that, in their zeal to destroy prejudices, they have attempted to tear up by the roots many of the best and happiest and most essential principles of our nature. Having remarked the powerful influence of education over the mind, they have concluded, that man is wholly a factitious being; not recollecting, that this very susceptibility of education presupposes certain original principles, which are common to the whole species; and that, as errour can only take a permanent hold of a candid mind by being grafted on truths which it is unwilling or unable to eradicate, even the influence which false and absurd opinions occasionally acquire over the belief, instead of being an argument for universal scepticism, is the most decisive argument against it; in as much as it shews, that there are some truths so incorporated and identified with our nature, that they can reconcile us even to the absurdities and contradictions with which we suppose them to be inseparably connected. The sceptical philosophers, for example, of the present age, have frequently attempted to hold up to ridicule those contemptible and puerile superstitions, which have disgraced the creeds of some of the most enlightened nations; and which have not only commanded the assent, but the reverence, of men of the most accomplished understandings. But these histories of human imbecility, are, in truth, the strongest testimonies which can be produced to prove, how wonderful is the influence of the fundamental principles of morality over the belief; when they are able to sanctify, in the apprehensions of mankind, every extravagant opinion, and every unmeaning ceremony, which early education has taught us to associate with them.

That implicit credulity is a mark of a feeble mind, will not be disputed; but it may not, perhaps, be as generally acknowledged, that the case is the same with unlimited scepticism: on the contrary, we are sometimes apt to ascribe this disposition to a more than ordinary vigour of intellect. Such a prejudice was by no means unnatural at that period in the history of modern Europe, when reason first began to throw off the yoke of authority; and when it unquestionably required a superiority of understanding, as well as of intrepidity, for an individual to resist the contagion of prevailing superstition. But in the present age, in which the tendency of fashionable opinions is directly opposite to those of the vulgar; the philosophical creed, or the philosophical scepticism, of by far the greater number of those, who value themselves on an emancipation from popular errours, arises from the very same weakness with the credulity of the multitude: nor is it going too far to say, with Rousseau, that "He, who, "in the end of the eighteenth century, has brought himself to aban-"don all his early principles without discrimination, would probably "have been a bigot in the days of the League." In the midst of these contrary impulses of fashionable and of vulgar prejudices, he alone evinces the superiority and the strength of his mind, who is able to disentangle truth from errour; and to oppose the clear conclusions of his own unbiassed faculties to the united clamours of superstition and of false philosophy.—Such are the men, whom nature marks out to be the lights of the world, to fix the wavering opinions of the multitude, and to impress their own characters on that of their age.

For securing the mind completely from the weaknesses I have now been describing, and enabling it to maintain a steady course of inquiry, between implicit credulity and unlimited scepticism, the most important of all qualities is a sincere and devoted attachment to truth, which seldom fails to be accompanied with a manly confidence in the clear conclusions of human reason. It is such a confidence, united, (as it generally is) with personal intrepidity, which forms what the French writers call force of character; one of the rarest endowments, it must be confessed, of our species; but which, of all endowments, is the most essential for rendering a philosopher happy in himself, and a blessing to mankind.

There is, I think, good reason for hoping, that the sceptical tendency of the present age will be only a temporary evil. While it continues, however, it is an evil of the most alarming nature; and, as it extends in general not only to religion and morality, but, in some measure, also to politics and the conduct of life, it is equally fatal to the comfort of the individual, and to the improvement of society. Even in its most inoffensive form, when it happens to be united with a peaceable disposition and a benevolent heart, it cannot fail to have the effect of damping every active and patriotic exertion. Convinced that truth is placed beyond the reach of the human faculties; and doubtful how far the prejudices we despise may not be essential to the well being of society, we resolve to abandon completely all speculative inquiries; and, suffering ourselves to be carried quietly along with the stream of popular opinions and of fashionable manners, determine to amuse ourselves, the best way we can, with business or pleasure, during our short passage through this scene of illusions. But he who thinks more favourably of the human powers, and who believes that reason was given to man to direct him to his duty and his happiness, will despise the suggestions of this timid philosophy; and while he is conscious that he is guided in his inquiries only by the love of truth, will rest assured that their result will be equally favourable to his own comfort, and to the best interests of mankind. What, indeed, will be the particular effects, in the first instance, of that general diffusion of knowledge, which the art of printing must sooner or later produce, and of that spirit of reformation with which it cannot fail to be accompanied, it is beyond the reach of human sagacity to conjecture; but unless we choose to abandon ourselves entirely to a desponding scepticism, we must hope and believe, that the progress of human reason can never be a source of permanent disorder to the world; and that they alone have cause to apprehend the consequences, who are led, by the imperfection of our present institutions, to feel themselves interested in perpetuating the prejudices and follies of their species.

From the observations which have been made, it sufficiently appears, that in order to secure the mind, on the one hand, from the influence of prejudice; and on the other, from a tendency to unlimited scepticism, it is necessary that it should be able to distinguish the original and universal principles and laws of human nature, from the adventitious effects of local situation. But if, in the case of an individual, who has received an imperfect, or erroneous education, such a knowledge puts it in his power to correct, to a certain degree, his own bad habits, and to surmount his own speculative errours; it enables him to be useful, in a much higher degree, to those whose education he has an opportunity of superintending from early infancy. Such, and so permanent, is the effect of first impressions on the character, that although a philosopher may succeed, by perseverance, in freeing his reason from the prejudices with which it was entangled, they will still retain some hold of his imagination and his affections: and, therefore, however enlightened his understanding may be in his hours of speculation, his philosophical opinions will frequently lose their influence over his mind, in those very situations, in which their practical assistance is most required:—when his temper is soured by misfortune; or when he engages in the pursuits of life, and exposes himself to the contagion of popular errours. His opinions are supported merely by speculative arguments; and, instead of being connected with any of the active principles of his nature, are counteracted and thwarted by some of the most powerful of them. How different would the case be, if education were conducted, from the beginning, with attention and judgment? Were the same pains taken to impress truth on the mind in early infancy, that is often taken to inculcate errour, the great principles of our conduct would not only be juster than they are; but, in consequence of the aid which they would receive from the imagination and the heart, trained to conspire with them in the same direction, they would render us happier in ourselves, and would influence our practice more powerfully and more habitually. There is surely nothing in errour which is more congenial to the mind than truth. On the contrary, when exhibited separately and alone to the understanding, it shocks our reason, and provokes our ridicule; and it is only, (as I had occasion already to remark,) by an alliance with truths, which we find it difficult to renounce, that it can obtain our assent, or command our reverence. What advantages, then, might be derived from a proper attention to early impressions and associations, in giving support to those principles which are connected with human happiness? The long reign of errour in the world, and the influence it maintains, even in an age of liberal inquiry, far from being favourable to the supposition, that human reason is destined to be for ever the sport of prejudice and absurdity, demonstrates the tendency which there is to permanence in established opinions, and in established institutions; and promises an eternal stability to true philosophy, when it shall once have acquired the ascendant; and when proper means shall be employed to support it, by a more perfect system of education.

Let us suppose, for a moment, that this happy æra were arrived, and that all the prepossessions of childhood and youth were directed to support the pure and sublime truths of an enlightened morality.—With what ardour, and with what transport, would the understanding, when arrived at maturity, proceed in the search of truth; when, instead of being obliged to struggle, at every step, with early prejudices, its office was merely to add the force of philosophical conviction to impressions, which are equally delightful to the imagination, and dear to the heart! The prepossessions of childhood would, through the whole of life, be gradually acquiring strength from the enlargement of our knowledge; and, in their turn, would fortify the conclusions of our reason, against the sceptical suggestions of disappointment or melancholy.

Our daily experience may convince us, how susceptible the tender mind is of deep impressions; and what important and permanent effects are produced on the characters and the happiness of individuals, by the casual associations formed in childhood among the various ideas, feelings, and affections, with which they were habitually occupied. It is the business of education not to counteract this constitution of nature, but to give it a proper direction: and the miserable consequences to which it leads, when under an improper regulation, only shew what an important instrument of human improvement it might be rendered, in more skilful hands. If it be possible to interest the imagination and the heart in favour of errour, it is, at least, no less possible to interest them in favour of truth. If it be possible to extinguish all the most generous and heroic feelings of our nature, by teaching us to connect the idea of them with those of guilt and impiety, it is surely equally possible to cherish and strengthen them, by establishing the natural alliance between our duty and our happiness. If it be possible for the influence of fashion to veil the native deformity of vice, and to give to low and criminal indulgences the appearance of spirit, of elegance, and of gayety; can we doubt of the possibility of connecting, in the tender mind, these pleasing associations with pursuits that are truly worthy and honourable?—There are few men to be found, among those who have received the advantages of a liberal education, who do not retain, through life, that admiration of the heroic ages of Greece and Rome, with which the classical authors once inspired them. It is, in truth, a fortunate prepossession, on the whole, and one of which I should be sorry to counteract the influence. But are there not others of equal importance to morality and to happiness, with which the mind might, at the same period of life, be inspired? If the first conceptions, for example, which an infant formed of the Deity, and its first moral perceptions, were associated with the early impressions produced on the heart by the beauties of nature, or the charms of poetical description, those serious thoughts which are resorted to, by most men, merely as a source of consolation in adversity, and which, on that very account, are frequently tinctured with some degree of gloom, would recur spontaneously to the mind in its best and happiest hours; and would insensibly blend themselves with all its purest and most refined enjoyments.

In those parts of Europe, where the prevailing opinions involve the greatest variety of errours and corruptions, it is, I believe, a common idea with many respectable and enlightened men, that, in every country, it is most prudent to conduct the religious instruction of youth upon the plan which is prescribed by the national establishment; in order that the pupil, according to the vigour or feebleness of his mind, may either shake off, in future life, the prejudices of the nursery, or die in the popular persuasion. This idea, I own, appears to me to be equally ill-founded and dangerous. If religious opinions have, as will not be disputed, a powerful influence on the happiness and on the conduct of mankind, does not humanity require of us, to rescue as many victims as possible from the hands of bigotry; and to save them from the cruel alternative, of remaining under the gloom of a depressing superstition, or of being distracted by a perpetual conflict between the heart and the understanding?—It is an enlightened education alone, that, in most countries of Europe, can save the young philosopher from that anxiety and despondence, which every man of sensibility, who, in his childhood, has imbibed the popular opinions, must necessarily experience, when he first begins to examine their foundation; and, what is of still greater importance, which can save him, during life, from that occasional scepticism, to which all men are liable, whose systems fluctuate with the inequalities of their spirits, and the variations of the atmosphere.

I shall conclude this subject, with remarking, that, although in all moral and religious systems, there is a great mixture of important truth, and although it is, in consequence of this alliance, that errours and absurdities are enabled to preserve their hold of the belief, yet it is commonly found, that, in proportion as an established creed is complicated in its dogmas and in its ceremonies, and in proportion to the number of accessory ideas which it has grafted upon the truth, the more difficult is it for those who have adopted it in childhood, to emancipate themselves completely from its influence; and, in those cases in which they at last succeed, the greater is their danger of abandoning, along with their errours, all the truths which they had been taught to connect with them. The Roman Catholic system is shaken off with much greater difficulty, than those which are taught in the reformed churches; but when it loses its hold of the mind, it much more frequently prepares the way for unlimited scepticism. The causes of this I may perhaps have an opportunity of pointing out, in treating of the association of ideas.

I have now finished all that I think necessary to offer, at present, on the application of the philosophy of mind to the subject of education. To some readers, I am afraid, what I have advanced on the subject, will appear to border upon enthusiasm; and I will not attempt to justify myself against the charge. I am well aware of the tendency, which speculative men sometimes have, to magnify the effects of education, as well as to entertain too sanguine views of the improvement of the world; and I am ready to acknowledge that there are instances of individuals, whose vigour of mind is sufficient to overcome every thing that is pernicious in their early habits: but I am fully persuaded, that these instances are rare; and that by far the greater part of mankind continue, through life, to pursue the same track into which they have been thrown by the accidental circumstances of situation, instruction, and example.

SECTION II.

Continuation of the same Subject.

The remarks which have been hitherto made on the utility of the philosophy of the human mind, are of a very general nature, and apply equally to all descriptions of men. Besides, however, these more obvious advantages of the study, there are others, which, though less striking and less extensive in their application, are nevertheless, to some particular classes of individuals, of the highest importance. Without pretending to exhaust the subject, I shall offer a few detached observations upon it, in this section.

I already took notice, in general terms, of the common relation which all the different branches of our knowledge bear to the philosophy of the human mind. In consequence of this relation, it not only forms an interesting object of curiosity to literary men of every denomination, but, if successfully prosecuted, it cannot fail to furnish useful lights for directing their inquiries; whatever the nature of the subjects may be, which happen to engage their attention.

In order to be satisfied of the justness of this observation, it is sufficient to recollect, that to the philosophy of the mind are to be referred all our inquiries concerning the divisions and the classifications of the objects of human knowledge, and also, all the various rules, both for the investigation, and the communication, of truth. These general views of science, and these general rules of method, ought to form the subjects of a rational and useful logic; a study, undoubtedly, in itself of the greatest importance and dignity, but in which less progress has hitherto been made than is commonly imagined.

I shall endeavour to illustrate, very briefly, a few of the advantages which might be expected to result from such a system of logic, if properly executed.

I. And, in the first place, it is evident that it would be of the highest importance in all the sciences, (in some of them, indeed, much more than in others,) to exhibit a precise and steady idea of the objects which they present to our inquiry.—What was the principal circumstance which contributed to mislead the ancients, in their physical researches? Was it not their confused and wavering notions about the particular class of truths, which it was their business to investigate? It was owing to this, that they were led to neglect the obvious phenomena and laws of moving bodies; and to indulge themselves in conjectures about the efficient causes of motion, and the nature of those minds, by which they conceived the particles of matter to be animated; and that they so often blended the history of facts with their metaphysical speculations. In the present state of science, indeed, we are not liable to such mistakes in natural philosophy, but it would be difficult to mention any other branch of knowledge, which is entirely exempted from them. In metaphysics, I might almost say, they are at the bottom of all our controversies. In the celebrated dispute, for example, which has been so long carried on, about the explanation given by the ideal theory of the phenomena of perception, the whole difficulty arose from this, that philosophers had no precise notion of the point they wished to ascertain; and now, that the controversy has been brought to a conclusion, (as I think all men of candour must confess it to have been by Dr. Reid) it will be found, that his doctrine on the subject throws no light whatever on what was generally understood to be the great object of inquiry, I mean, on the mode of communication between the mind and the material world: and, in truth, amounts only to a precise description of the fact, stripped of all hypothesis, and stated in such a manner, as to give us a distinct view of the insurmountable limits which nature has in this instance prescribed to our curiosity. The same observation may be made on the reasonings of this profound and original author, with respect to some metaphysical questions that had been started on the subject of vision; in particular, concerning the cause of our seeing objects single with two eyes, and our seeing objects erect, by means of inverted images on the retina.

If we were to examine, in like manner, the present state of morals, of jurisprudence, of politics, and of philosophical criticism, I believe we should find, that the principal circumstance which retards their progress, is the vague and indistinct idea, which those who apply to the study of them have formed to themselves of the objects of their researches. Were these objects once clearly defined, and the proper plan of inquiry for attaining them illustrated by a few unexceptionable models, writers of inferiour genius would be enabled to employ their industry to much more advantage; and would be prevented from adding to that rubbish, which, in consequence of the ill-directed ingenuity of our predecessors, obstructs our progress in the pursuit of truth.

As a philosophical system of logic would assist us in our particular scientific investigations, by keeping steadily in our view the attainable objects of human curiosity, so, by exhibiting to us the relation in which they all stand to each other, and the relation which they all bear to what ought to be their common aim, the advancement of human happiness, it would have a tendency to confine industry and genius to inquiries which are of real practical utility; and would communicate a dignity to the most subordinate pursuits which are in any respect subservient to so important a purpose. When our views are limited to one particular science, to which we have been led to devote ourselves by taste or by accident, the course of our studies resembles the progress of a traveller through an unknown country, whose wanderings, from place to place, are determined merely by the impulse of occasional curiosity, and whose opportunities of information must necessarily be limited to the objects which accidentally present themselves to his notice. It is the philosophy of the mind alone, which by furnishing us with a general map of the field of human knowledge, can enable us to proceed with steadiness, and in an useful direction; and while it gratifies our curiosity, and animates our exertions, by exhibiting to us all the various bearings of our journey, can conduct us to those eminences from whence the eye may wander over the vast and unexplored regions of science. Lord Bacon was the first person who took this comprehensive view of the different departments of study; and who pointed out, to all the classes of literary men, the great end to which their labours should conspire; the multiplication of the sources of human enjoyment, and the extension of man's dominion over nature. Had this object been kept steadily in view by his followers, their discoveries, numerous and important as they have been, would have advanced with still greater rapidity, and would have had a much more extensive influence on the practical arts of life.[*]

From such a system of logic, too, important assistance might be expected, for reforming the established plan of public or academical education. It is melancholy to reflect on the manner in which this is carried on, in most, perhaps, I might say, in all the countries of Europe; and that, in an age of comparative light and liberality, the intellectual and moral characters of youth should continue to be formed on a plan devised by men, who were not only strangers to the business of the world, but who felt themselves interested in opposing the progress of useful knowledge.

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[*] Omnium autem gravissimus error in deviatione ab ultimo doctrinarum fine consistit. Appetunt enim homines scientiam, alii ex insitâ curiositate et irrequietâ; alii animi causâ et delectationis, alii existimationis gratiâ: alii contentionis ergo, atque ut in disserendo superiores sint: plerique propter lucrum et victum: paucissimi, ut donum rationis, divinitus datum, in usus humani generis impendant.—Hoc enim illud est, quod revera doctrinam atque artes condecoraret et attolleret, si contemplatio, et actio, arctiore quam adhuc vinculo copularentur. De Aug. Scient. lib. i.

For accomplishing a reformation in the plan of academical study, on rational and systematical principles, it is necessary, in the first place to consider the relation in which the different branches of literature, and the different arts and sciences, stand to each other, and to the practical purposes of life: and secondly, to consider them in relation to the human mind, in order to determine the arrangement, best fitted for unfolding and maturing its faculties. Many valuable hints towards such a work may be collected from Lord Bacon's writings.

II. Another very important branch of a rational system of logic (as I had occasion already to observe) ought to be, to lay down the rules of investigation which it is proper to follow in the different sciences. In all of these, the faculties of the understanding are the instruments with which we operate; and without a previous knowledge of their nature, it is impossible to employ them to the best advantage. In every exercise of our reasoning and of our inventive powers, there are general laws which regulate the progress of the mind; and when once these laws are ascertained, they enable us to speculate and to invent, for the future, with more system, and with a greater certainty of success.—In the mechanical arts, it is well known, how much time and ingenuity are misapplied, by those who acquire their practical skill by their own trials, undirected by the precepts or example of others. What we call the rules of an art, are merely a collection of general observations, suggested by long experience, with respect to the most compendious and effectual means of performing every different step of the processes which the art involves. In consequence of such rules, the artist is enabled to command the same success in all his operations, for which the unskilled workman must trust to a happy combination of accidental circumstances; the misapplications, too, of the labour of one race are saved to the next; and the acquisition of practical address is faciliated, by confining its exertions to one direction.—The analogy is perfect in those processes, which are purely intellectual, and to regulate which is the great object of logic. In the case of individuals, who have no other guide to direct them in their inquiries than their own natural sagacity, much time and ingenuity must inevitably be thrown away, in every exertion of the inventive powers. In proportion, however, to the degree of their experience and observation, the number of these misapplications will diminish; and the power of invention will be enabled to proceed with more certainty and steadiness to its object. The misfortune is, that as the aids which the understanding derives from experience, are seldom recorded in writing, or even described in words, every succeeding inquirer finds himself, at the commencement of his philosophical pursuits, obliged to struggle with the same disadvantages which had retarded the progress of his predecessors. If the more important practical rules, which habits of investigation suggest to individuals, were diligently preserved, each generation would be placed in circumstances more favourable to invention than the preceding; and the progress of knowledge, instead of cramping original genius, would assist and direct its exertions. In the infancy of literature, indeed, its range may be more unbounded, and its accidental excursions may excite more astonishment, than in a cultivated and enlightened age; but it is only in such an age, that inventive genius can be trained by rules founded on the experience of our predecessors, in such a manner as to insure the gradual and regular improvement of science. So just is the remark of Lord Bacon: "Certo sciant homi-"nes, artes inveniendi solidas et veras adolescere et incrementa su-"mere cum ipsis inventis."

The analogy between the mechanical arts and the operations of scientific invention, might perhaps be carried further. In the former, we know how much the natural powers of man have been assisted, by the use of tools and instruments. Is it not possible to devise, in like manner, certain aids to our intellectual faculties?

That such a query is not altogether chimerical, appears from the wonderful effects of Algebra (which is precisely such an instrument of thought as I have been now alluding to) in facilitating the inquiries of modern mathematicians. Whether it might not be possible to realize a project which Leibnitz has somewhere mentioned, of introducing a similar contrivance into other branches of knowledge, I shall not take upon me to determine; but that this idea has at least some plausibility, must, I think, be evident to those, who have reflected on the nature of the general terms which abound more or less in every cultivated language; and which may be considered as one species of instrumental aid, which art has discovered to our intellectual powers. From the observations which I am afterwards to make, it will appear, that, without general terms, all our reasonings must necessarily have been limited to particulars; and, consequently, it is owing to the use of these, that the philosopher is enabled to speculate concerning classes of objects, with the same facility, with which the savage or the peasant speculates concerning the individuals of which they are composed. The technical terms, in the different sciences, render the appropriate language of philosophy a still more convenient instrument of thought, than those languages which have originated from popular use; and in proportion as these technical terms improve in point of precision and comprehensiveness, they will contribute to render our intellectual progress more certain and more rapid. "While engaged" (says Mr. Lavoisier) "in the composition of my Elements of Chemistry, I per-"ceived, better than I had ever done before, the truth of an obser-"vation of Condillac, that we think only through the medium of "words; and that languages are true analytical methods. Algebra, "which, of all our modes of expression, is the most simple, the "most exact, and the best adapted to its purpose, is at the same "time, a language and an analytical method. The art of reasoning "is nothing more than a language well arranged." The influence which these very enlightened and philosophical views have already had on the doctrines of chemistry, cannot fail to be known to most of my readers.

The foregoing remarks, in so far as they relate to the possibility of assisting our reasoning and inventive powers by new instrumental aids, may perhaps appear to be founded too much upon theory; but this objection cannot be made to the reasonings I have offered on the importance of the study of method.—To the justness of these, the whole history of science bears testimony; but more especially, the histories of Physics and of pure Geometry; which afford so remarkable an illustration of the general doctrine, as can scarcely fail to be satisfactory, even to those, who are the most disposed to doubt the efficacy of art in directing the exertions of genius.

With respect to the former, it is sufficient to mention the wonderful effects which the writings of Lord Bacon have produced, in accelerating its progress. The philosophers, who flourished before his time, were, undoubtedly, not inferiour to their successors, either in genius or industry: but their plan of investigation was erroneous; and their labours have produced only a chaos of fictions and absurdities. The illustrations which his works contain, of the method of induction, general as the terms are in which they are expressed, have gradually turned the attention of the moderns to the rules of philosophizing; and have led the way to those important and sublime discoveries in physics, which reflect so much honour on the present age.

The rules of philosophizing, however, even in physics, have never yet been laid down with a sufficient degree of precision, minuteness, or method; nor have they ever been stated and illustrated in so clear and popular a manner, as to render them intelligible to the generality of readers. The truth, perhaps, is, that the greater part of physical inquirers have derived what knowledge of them they possess, rather from an attention to the excellent models of investigation which the writings of Newton exhibit, than from any of the speculations of Lord Bacon, or his commentators: and, indeed, such is the incapacity of most people for abstract reasoning, that I am inclined to think, even if the rules of inquiry were delivered in a perfectly complete and unexceptionable form, it might still be expedient to teach them to the majority of students, rather by examples, than in the form of general principles. But it does not therefore follow, that an attempt to illustrate and to methodize these rules would be useless; for it must be remembered, that, although an original and inventive genius, like that of Newton, be sufficient to establish a standard for the imitation of his age, yet, that the genius of Newton himself was encouraged and led by the light of Bacon's philosophy.

The use which the ancient Greek geometers made of their *analysis*, affords an additional illustration of the utility of method in guiding scientific invention. To facilitate the study of this species of investigation, they wrote no less than thirty-three preparatory books; and they considered an address, in the practice of it, (or, as Marinus calls it, a δυναμις αναλυτικη) as of much more value, than an extensive acquaintance with the principles of the science.* Indeed, it is well known to every one who is at all conversant with geometrical investigations, that although it may be possible for a person, without the assistance of the method of analysis, to stumble accidentally on a solution, or on a demonstration, yet it is impossible for him to possess a just confidence in his own powers, or to carry on a regular plan of invention and discovery. It is well known, too, that an acquaintance with this method brings geometers much more nearly upon a level with each other, than they would be otherwise: not that it is possible, by any rules, to supersede, entirely, ingenuity and address; but, because, in consequence of the uniformity of the plan on which the method proceeds, experience communicates a certain dexterity in the use of it, which must in time give to a very ordinary degree of sagacity, a superiority, on the whole, to the greatest natural ingenuity, unassisted by rule.†

To these observations, I believe I may add, that, after all that was done by the Greek philosophers to facilitate mathematical invention, many rules still remain to be suggested, which might be of important use, even in pure geometry. A variety of such occur to every experienced mathematician in the course of his inquiries, although, perhaps, he may not be at the trouble to state them to himself in words; and it would plainly have saved him much expense of time and thought, beside enabling him to conduct his researches on a more regular plan, if he had been taught them systematically at the commencement of his studies. The more varied, abstruse, and general investigations of the moderns stand in need, in a much greater degree, of the guidance of philosophical principles; not only for enabling us to conduct, with skill, our particular researches, but for directing us to the different methods of reasoning, to which we ought to have recourse on different occasions. A collection of such rules would form, what might be called with propriety, the logic of mathematics; and would probably contribute greatly to the advancement of all of those branches of knowledge, to which mathematical learning is subservient.

The observations which have been now made, on the importance of method in conducting physical and mathematical researches, particularly those which relate to the last of these subjects, will not apply literally to our inquiries in metaphysics, morals, or politics; because, in these sciences, our reasonings always consist of a comparatively small number of intermediate steps, and the obstacles, which retard our progress, do not, as in mathematics, arise from the difficulty of finding media of comparison among our ideas. Not that these obstacles are less real, or more easily surmounted: on the contrary, it seems to require a still rarer combination of talents to surmount them; for how small is the number of individuals, who are qualified to think justly on metaphysical, moral, or political subjects, in comparison of those, who may be trained by practice to follow the longest processes of mathematical reasoning. From what these obstacles arise, I shall not inquire particularly at present. Some of the more important of them may be referred to the imperfections of language; to the difficulty of annexing precise and steady ideas to our words; to the difficulty, in some cases, of conceiving the subjects of our reasoning; and, in others, of discovering, and keeping in view, all the various circumstances upon which our judgment ought to proceed; and above all, to the prejudices, which early impressions and associations create, to warp our opinions.—To illustrate these sources of errour, in the different sciences which are liable to be affected by them, and to point out the most effectual means for guarding against them, would form another very interesting article in a philosophical system of logic.

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* *Μειζον εστι, το δυναμιν αναλυτικην κτησασθαι, του πολλας αποδειξεις των επι μερους εχειν.*

† "Mathematica multi sciunt, mathesin pauci. Aliud est enim nosse propositiones aliquot, et nonnullas ex iis obvias elicere, casu potius quam certa aliqua discurrendi norma, aliud scientiae ipsius naturam ac indolem perspectam habere, in ejus se adyta penetrare, et ab universalibus instructum esse praeceptis, quibus theoremata ac problemata innumera excogitandi, eademque demonstrandi, facilitas comparetur. Ut enim pictorum vulgus prototypon saepe saepius exprimendo, quendam pingendi usum, nullam vero pictoriae artis quam optica suggerit scientiam adquirit, ita multi, lectis Euclidis et aliorum geometrarum libris, eorum imitatione fingere propositiones aliquas ac demonstrare solent, ipsam tamen secretissimam difficiliorum theorematum ac problematum solvendi methodum prorsus ignorant."—Joannis de la Faille Theoremata de Centro Gravitatis, in praefat.—Antwerpiae, 1632.

The method of communicating to others the principles of the different sciences, has been as much neglected by the writers on logic, as the rules of investigation and discovery, and yet, there is certainly no undertaking whatever, in which their assistance is more indispensibly requisite. The first principles of all the sciences are intimately connected with the philosophy of the human mind; and it is the province of the logician to state these in such a manner, as to lay a solid foundation for the superstructures which others are to rear.—It is in stating such principles, accordingly, that elementary writers are chiefly apt to fail. How unsatisfactory, for example, are the introductory chapters in most systems of natural philosophy! not in consequence of any defect of physical or of mathematical knowledge in their authors, but in consequence of a want of attention to the laws of human thought, and to the general rules of just reasoning. The same remark may be extended to the form, in which the elementary principles of many of the other sciences are commonly exhibited; and, if I am not mistaken, this want of order among the first ideas which they present to the mind, is a more powerful obstacle to the progress of knowledge, than is generally imagined.

I shall only observe farther, with respect to the utility of the philosophy of mind, that as there are some arts, in which we not only employ the intellectual faculties as instruments, but operate on the mind as a subject, so, to those individuals who aim at excellence in such pursuits, the studies I have now been recommending, are, in a more peculiar manner, interesting and important. In poetry, in painting, in eloquence, and in all the other fine arts, our success depends on the skill with which we are able to adapt the efforts of our genius to the human frame; and it is only on a philosophical analysis of the mind, that a solid foundation can be laid for their farther improvement. Man, too, is the subject on which the practical moralist and the enlightened statesman have to operate. Of the former, it is the professed object to engage the attention of individuals to their own best interests, and to allure them to virtue and happiness, by every consideration, that can influence the understanding, the imagination, or the heart. To the latter, is assigned the sublimer office of seconding the benevolent intentions of Providence in the administration of human affairs; to diffuse as widely and equally as possible, among his fellow-citizens, the advantages of the social union; and, by a careful study of the constitution of man, and of the circumstances in which he is placed, to modify the political order in such a manner, as may allow free scope and operation to those principles of intellectual and moral improvement, which nature has implanted in our species.

In all these cases, I am very sensible, that the utility of systematical rules has been called in question by philosophers of note, and that many plausible arguments in support of their opinion may be derived from the small number of individuals who have been regularly trained to eminence in the arts, in comparison of those who have been guided merely by untutored genius, and the example of their predecessors. I know, too, that it may be urged with truth, that rules have, in some cases, done more harm than good, and have misled, instead of directing, the natural exertions of the mind. But, in all such instances, in which philosophical principles have failed in producing their intended effect, I will venture to assert, that they have done so, either in consequence of errours, which were *accidentally blended* with them, or, in consequence of their possessing *only that slight* and partial influence over the genius, which enabled them to derange its previously acquired habits, without regulating its operations, upon a systematical plan, with steadiness and efficacy. In all the arts of life, whether trifling or important, there is a certain degree of skill, which may be attained by our untutored powers, aided by imitation; and this skill, instead of being perfected by rules, may, by means of them, be diminished or destroyed, if these rules are partially and imperfectly apprehended, or even if they are not so familiarized to the understanding, as to influence its exertions uniformly and habitually. In the case of a musical performer, who has learned his art merely by the ear, the first effects of systematical instruction are, I believe, always unfavourable. The effect is the same of the rules of elocution, when first communicated to one who has attained, by his natural taste and good sense, a tolerable propriety in the art of reading. But it does not follow from this, that, in either of these arts, rules are useless. It only follows, that, in order to unite ease and grace with correctness, and to preserve the felicities of original genius amidst those restraints which may give them an useful direction, it is necessary that the acquisitions of education should, by long and early habits, be rendered, in some measure, a second nature.—The same observations will be found to apply, with very slight alterations, to arts of more serious importance.—In the art of legislation, for example, there is a certain degree of skill, which may be acquired merely from the routine of business; and when once a politician has been formed, in this manner, among the details of office, a partial study of general principles will be much more likely to lead him astray, than to enlighten his conduct. But there is nevertheless a science of legislation, which the details of office and the intrigues of popular assemblies will never communicate; a science, of which the principles must be sought for in the constitution of human nature, and in the general laws which regulate the course of human affairs; and which, if ever in consequence of the progress of reason, philosophy should be enabled to assume that ascendant in the government of the world, which has hitherto been maintained by accident, combined with the passions and caprices of a few leading individuals, may, perhaps, produce more perfect and happy forms of society, than have yet been realized in the history of mankind.

I have thus endeavoured to point out and illustrate a few of the most important purposes, to which the philosophy of the human mind is subservient. It will not, however, I flatter myself, be supposed by any of my readers, that I mean to attempt a systematical work on all, or any of the subjects I have now mentioned; the most limited of which would furnish matter for many volumes. What I have aimed at, has been, to give, in the first place, as distinct and complete an analysis as I could, of the principles, both intellectual and active, of our nature; and, in the second place, to illustrate, as I proceed, the application of these general laws of the human constitution, to the different classes of phenomena which result from them. In the selection of these phenomena, although I have sometimes been guided chiefly by the curiosity of the moment, or the accidental course of my own studies, yet, I have had it in view to vary as far as possible the nature of my speculations, in order to show how numerous and different the applications are, of which this philosophy is susceptible. It will not, therefore, I hope, be objected to me, that I have been guilty of a blameable violation of unity in the plan of my work, till it be considered how far such a violation was useful for accomplishing the purposes for which I write. One species of unity, I am willing to believe, an attentive reader will be able to trace in it; I mean, that uniformity of thought and design, "which" (as Butler well remarks,) "we may always "expect to meet with in the compositions of the same author, when "he writes with simplicity, and in earnest."

ELEMENTS

OF THE

PHILOSOPHY OF THE HUMAN MIND.

CHAPTER FIRST.

OF THE POWERS OF EXTERNAL PERCEPTION.

SECTION I.

Of the theories which have been formed by Philosophers, to explain the manner in which the MIND perceives external objects.

AMONG the various phenomena which the human mind presents to our view, there is none more calculated to excite our curiosity and our wonder, than the communication which is carried on between the sentient, thinking, and active principle within us, and the material objects with which we are surrounded. How little soever the bulk of mankind may be disposed to attend to such inquiries, there is scarcely a person to be found, who has not occasionally turned his thoughts to that mysterious influence, which the will possesses over the members of the body, and to those powers of perception, which seem to inform us, by a sort of inspiration, of the various changes which take place in the external universe. Of those who receive the advantages of a liberal education, there are perhaps few, who pass the period of childhood, without feeling their curiosity excited by this incomprehensible communication between mind and matter. For my own part at least, I cannot recollect the date of my earliest speculations on the subject.

It is to the phenomena of perception alone, that I am to confine myself in the following essay; and even with respect to these, all that I propose, is to offer a few general remarks on such of the common mistakes concerning them, as may be most likely to mislead us in our future inquiries. Such of my readers as wish to consider them more in detail will find ample satisfaction in the writings of Dr. Reid.

In considering the phenomena of perception, it is natural to suppose, that the attention of philosophers would be directed, in the first instance, to the sense of seeing. The variety of information and of enjoyment we receive by it, the rapidity with which this information and enjoyment are conveyed to us, and above all, the intercourse it enables us to maintain with the more distant part of the universe, cannot fail to give it, even in the apprehension of the most careless observer, a pre-eminence over all our other perceptive faculties. Hence it is, that the various theories, which have been formed to explain the operations of our senses, have a more immediate reference to that of seeing; and that the greater part of the metaphysical language, concerning perception in general, appears evidently, from its etymology, to have been suggested by the phenomena of vision. Even when applied to this sense, indeed, it can at most amuse the fancy, without conveying any precise knowledge; but, when applied to the other senses, it is altogether absurd and unintelligible.

It would be tedious and useless, to consider particularly the different hypotheses, which have been advanced upon this subject. To all of them, I apprehend, the two following remarks will be found applicable: First, that, in the formation of them, their authors have been influenced by some general maxims of philosophizing, borrowed from physics; and, secondly, that they have been influenced by an indistinct, but deep-rooted, conviction of the immateriality of the soul; which, although not precise enough to point out to them the absurdity of attempting to illustrate its operations by the analogy of matter, was yet sufficiently strong, to induce them to keep the absurdity of their theories as far as possible out of view, by allusions to those physical facts, in which the distinctive properties of matter are the least grossly and palpably exposed to our observation. To the former of these circumstances is to be ascribed the general principle, upon which all the known theories of perception proceed; that, in order to explain the intercourse between the mind and distant objects, it is necessary to suppose the existence of something intermediate, by which its perceptions are produced; to the latter, the various metaphorical expressions of *ideas*, *species*, *forms*, *shadows*, *phantasms*, *images*; which, while they amused the fancy with some remote analogies to the objects of our senses, did not directly revolt our reason, by presenting to us any of the tangible qualities of body.

" It was the doctrine of Aristotle, (says Dr. Reid) that, as our " senses cannot receive external material objects themselves, they " receive their *species*; that is, their images or forms, without the " matter; as wax receives the form of the seal, without any of the " matter of it. These images or forms, impressed upon the senses, " are called *sensible species*; and are the objects only of the sensi- " tive part of the mind: but by various, internal powers, they are " retained, refined, and spiritualized, so as to become objects of " memory and imagination; and, at last, of pure intellection. " When they are objects of memory and of imagination, they get " the name of *phantasms*. When, by farther refinement, and being " stripped of their particularities, they become objects of science, "they are called *intelligible species;* so that every immediate object, whether of sense, of memory, of imagination, or of reasoning, "must be some phantasm, or species, in the mind itself.

"The followers of Aristotle, especially the schoolmen, made great "additions to this theory; which the author himself mentions very "briefly, and with an appearance of reserve. They entered into "large disquisitions with regard to the sensible species, what kind "of things they are; how they are sent forth by the object, and "enter by the organs of the senses; how they are preserved and "refined by various agents, called internal senses, concerning the "number and offices of which they had many controversies."*

The Platonists, too, although they denied the great doctrine of the Peripatetics, that all the objects of human understanding enter at first by the senses, and maintained, that there exist eternal and immutable ideas, which were prior to the objects of sense, and about which all science was employed; yet appear to have agreed with them in their notions concerning the mode in which external objects are perceived. This Dr. Reid infers, partly from the silence of Aristotle about any difference between himself and his master upon this point, and partly from a passage in the seventh book of Plato's Republic; in which he compares the process of the mind in perception, to that of a person in a cave, who sees not external objects themselves, but only their shadows.†

"Two thousand years after Plato, (continues Dr. Reid,) Mr. "Locke, who studied the operations of the human mind so much, "and with so great success, represents our manner of perceiving external objects, by a similitude very much resembling that of the "cave.—"Methinks," says he, "the understanding is not much unlike a closet, wholly shut from light, with only some little opening left, to let in external visible resemblances or ideas of things "without. Would the pictures coming into such a dark room but "stay there, and lie so orderly as to be found upon occasion, it would "very much resemble the understanding of a man, in reference to "all objects of sight, and the ideas of them."‡

"Plato's subterranean cave, and Mr. Locke's dark closet, may be "applied with ease to all the systems of perception that have "been invented: for they all suppose that we perceive not external "objects immediately, and that the immediate objects of perception "are only certain shadows of the external objects. These shadows "or images which we immediately perceive, were by the ancients "called *species*, *forms*, *phantasms*. Since the time of Des Cartes, "they have commonly been called *ideas*;§ and by Mr. Hume, *impressions*. But all philosophers, from Plato to Mr. Hume, agree "in this, that we do not perceive external objects immediately; and "that the immediate object of perception must be some image present to the mind." On the whole, Dr. Reid remarks, "that in

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* Essays on the Intellectual Powers of Man, p. 25.

† Ibid. p. 99.

‡ Locke on Human Understanding, book ii. chap. 11. § 17.

§ See Note (B.)

" their sentiments concerning perception there appears an unifor-" mity, which rarely occurs upon subjects of so abstruse a na-" ture."*

The very short and imperfect view we have now taken of the common theories of perception, is almost sufficient, without any commentary, to establish the truth of the two general observations formerly made; for they all evidently proceed on a supposition, suggested by the phenomena of physics, that there must of necessity exist some medium of communication between the objects of perception and the percipient mind, and they all indicate a secret conviction in their authors, of the essential distinction between mind and matter; which, although not rendered, by reflection, sufficiently precise and satisfactory, to shew them the absurdity of attempting to explain the mode of their communication, had yet such a degree of influence on their speculations, as to induce them to exhibit their supposed medium under as mysterious and ambiguous a form as possible, in order that it might remain doubtful, to which of the two predicaments, of body or mind, they meant that it should be referred. By refining away the grosser qualities of matter; and by allusions to some of the most aerial and magical appearances it assumes, they endeavoured, as it were, to spiritualize the nature of their medium; while, at the same time, all their language concerning it, implied such a reference to matter, as was necessary for furnishing a plausible foundation, for applying to it the received maxims of natural philosophy.

Another observation, too, which was formerly hinted at, is confirmed by the same historical review; that, in the order of inquiry, the phenomena of vision had first engaged the attention of philosophers, and had suggested to them the greater part of their language with respect to perception in general; and that, in consequence of this circumstance, the common modes of expression on the subject, unphilosophical and fanciful at best, even when applied to the sense of seeing, are, in the case of all the other senses, obviously unintelligible and self-contradictory.—" As to objects of sight," says Dr. Reid, " I understand what is meant by an image of their figure " in the brain: but how shall we conceive an image of their colour, " where there is absolute darkness? And, as to all other objects of " sense, except figure and colour, I am unable to conceive what is " meant by an image of them. Let any man say, what he means by " an image of heat and cold, an image of hardness or softness, an " image of sound, or smell, or taste. The word *image*, when ap-" plied to these objects of sense, has absolutely no meaning."—This palpable imperfection in the ideal theory, has plainly taken rise from the natural order in which the phenomena of perception present themselves to the curiosity.

The mistakes, which have been so long current in the world, about this part of the human constitution, will, I hope, justify me for prosecuting the subject a little farther; in particular, for illustrating, at some length, the first of the two general remarks already referred to. This speculation I enter upon the more willingly, that it affords me an opportunity of stating some important principles with respect to the object and the limits of philosophical inquiry, to which I shall frequently have occasion to refer in the course of the following disquisitions.

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* Reid, p. 116, 117.

SECTION II.

Of certain natural Prejudices, which seem to have given rise to the common Theories of Perception.

It seems now to be pretty generally agreed among philosophers, that there is no instance in which we are able to perceive a necessary connexion between two successive events, or to comprehend in what manner the one proceeds from the other, as its cause. From experience, indeed, we learn, that there are many events, which are constantly conjoined, so that the one invariably follows the other: but it is possible, for any thing we know to the contrary, that this connexion, though a constant one, as far as our observation has reached, may not be a necessary connexion; nay, it is possible, that there may be no necessary connexions among any of the phenomena we see; and if there are any such connexions existing, we may rest assured that we shall never be able to discover them.*

I shall endeavour to shew, in another part of this work, that the doctrine I have now stated does not lead to those sceptical conclusions, concerning the existence of a First Cause, which an author of great ingenuity has attempted to deduce from it.—At present, it is sufficient for my purpose to remark, that the word *cause* is used, both by philosophers and the vulgar, in two senses, which are widely different.—When it is said, that every change in nature indicates the operation of a cause, the word *cause* expresses something which is supposed to be necessarily connected with the change, and without which it could not have happened. This may be called the *metaphysical* meaning of the word; and such causes may be called *metaphysical* or *efficient causes*.—In natural philosophy, however, when we speak of one thing being the cause of another, all that we mean is, that the two are constantly conjoined, so that, when we see the one, we may expect the other. These conjunctions we learn from experience alone, and, without an acquaintance with them, we could not accommodate our conduct to the established course of nature.—The causes which are the objects of our investigation in natural philosophy, may, for the sake of distinction, be called *physical causes*.

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* See Note (C.)

I am very ready to acknowledge, that this doctrine, concerning the object of natural philosophy, is not altogether agreeable to popular prejudices. When a man, unaccustomed to metaphysical speculations, is told, for the first time, that the science of physics gives us no information concerning the efficient causes of the phenomena about which it is employed, he feels some degree of surprise and mortification. The natural bias of the mind is surely to conceive physical events as somehow linked together, and material substances as possessed of certain powers and virtues, which fit them to produce particular effects. That we have no reason to believe this to be the case, has been shewn in a very particular manner by Mr. Hume, and by other writers, and must, indeed, appear evident to every person, on a moment's reflection. It is a curious question, what gives rise to the prejudice?

In stating the argument for the existence of the Deity, several modern philosophers have been at pains to illustrate that law of our nature, which leads us to refer every change we perceive in the universe, to the operation of an efficient cause.*—This reference is not the result of reasoning, but necessarily accompanies the perception, so as to render it impossible for us to see the change, without feeling a conviction of the operation of some cause by which it was produced; much in the same manner, in which we find it to be impossible to conceive a sensation, without being impressed with a belief of the existence of a sentient being. Hence, I apprehend, it is, that when we see two events constantly conjoined, we are led to associate the idea of causation, or efficiency, with the former, and to refer to it that power or energy by which the change was produced; in consequence of which association, we come to consider philosophy as the knowledge of efficient causes, and lose sight of the operation of mind in producing the phenomena of nature.—It is by an association somewhat similar, that we connect our sensations of colour with the primary qualities of body. A moment's reflection must satisfy any one, that the sensation of colour can reside only in the mind; and yet our natural bias is surely to connect colour with extension and figure, and to conceive *white*, *blue*, and *yellow*, as something spread over the surfaces of bodies. In the same way, we are led to associate with inanimate matter the ideas of *power*, *force*, *energy*, and *causation*, which are all attributes of mind, and can exist in mind only.

This bias of our nature is strengthened by another association. Our language, with respect to cause and effect, is borrowed by analogy from material objects. Some of these we see scattered about us, without any connexion between them, so that one of them may be removed from its place, without disturbing the rest. We can, however, by means of some material *vinculum*, connect two or more objects together; so that whenever the one is moved, the others shall follow. In like manner, we see some events, which occasionally follow one another, and which are occasionally disjoined: we see others, where the succession is constant and invariable. The former we conceive to be analogous to objects which are loose, and unconnected with each other, and whose contiguity in place is owing merely to accidental position; the others to objects, which are tied together by a material vinculum. Hence we transfer to such events, the same language which we apply to connected objects. We speak of a connexion between two events, and of a chain of causes and effects.*

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* See in particular, Dr. Reid's Essays on the Intellectual Powers of Man.

That this language is merely analogical, and that we know nothing of physical events, but the laws which regulate their succession, must, I think, appear very obvious to every person who takes the trouble to reflect on the subject; and yet it is certain, that it has misled the greater part of philosophers, and has had a surprising influence on the systems, which they have formed in very different departments of science.

A few remarks on some of the mistaken conclusions, to which the vulgar notions concerning the connexions among physical events have given rise, in natural philosophy, will illustrate clearly the origin of the common theories of perception; and will, at the same time, satisfy the reader, with respect to the train of thought which suggested the foregoing observations.

The maxim, that nothing can act but where it is, and when it is, has always been admitted, with respect to metaphysical or efficient causes. "Whatever objects," says Mr. Hume, "are considered as "causes or effects, are contiguous; and nothing can operate in a "time or place, which is ever so little removed from those of its "existence." "We may therefore (he adds) consider the relation "of contiguity as essential to that of causation."—But although this maxim should be admitted, with respect to causes which are efficient, and which, as such, are necessarily connected with their effects, there is surely no good reason for extending it to physical causes, of which we know nothing, but that they are the constant forerunners and signs of certain natural events. It may, indeed, be improper, according to this doctrine, to retain the expressions, *cause* and *effect*, in natural philosophy; but, as long as the present language upon the subject continues in use, the propriety of its application, in any particular instance, does not depend on the contiguity of the two events in place or time, but solely on this question, whether the one event be the constant and invariable forerunner of the other, so that it may be considered as its infallible sign?—Notwithstanding, however, the evidence of this conclusion, philosophers have in general proceeded upon a contrary supposition; and have discovered an unwillingness, even in physics, to call one event the cause of another, if the smallest interval of space or time existed between them. In the case of motion, communicated by impulse, they have no scruple to call the impulse the cause of the motion; but they will not admit that one body can be the cause of motion in another, placed at a distance from it, unless a connexion is carried on between them, by means of some intervening medium.

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* See Note (D.)

It is unnecessary for me, after what has already been said, to employ any arguments to prove, that the communication of motion by impulse is as unaccountable, as any other phenomenon in nature. Those philosophers who have attended at all to the subject, even they who have been the least sceptical with respect to cause and effect, and who have admitted a necessary connexion among physical events, have been forced to acknowledge, that they could not discover any necessary connexion between impulse and motion. Hence, some of them have been led to conclude, that the impulse only rouses the activity of the body, and that the subsequent motion is the effect of this activity, constantly exerted. "Motion," says one writer, "is action; and a continued motion implies a continued "action." "The impulse is only the cause of the beginning of the "motion: its continuance must be the effect of some other cause, "which continues to act as long as the body continues to move." The attempt which another writer of great learning has made, to revive the ancient theory of mind, has arisen from a similar view of the subject before us. He could discover no necessary connexion between impulse and motion; and concluded, that the impulse was only the *occasion* of the motion, the beginning and continuance of which he ascribed to the continued agency of the mind with which the body is animated.

Although, however, it be obvious, on a moment's consideration, that we are as ignorant of the connexion between impulse and motion, as of the connexion between fire and any of the effects we see it produce, philosophers, in every age, seem to have considered the production of motion by impulse, as almost the only physical fact which stood in need of no explanation. When we see one body attract another at a distance, our curiosity is roused, and we inquire how the connexion is carried on between them. But when we see a body begin to move in consequence of an impulse which another has given it, we inquire no farther: on the contrary, we think a fact sufficiently accounted for, if it can be shewn to be a case of impulse. This distinction, between motion produced by impulse, and the other phenomena of nature, we are led, in a great measure, to make, by confounding together efficient and physical causes; and by applying to the latter, maxims which have properly a reference only to the former.—Another circumstance, likewise, has probably considerable influence: that, as it is by means of impulse alone, that we ourselves have a power of moving external objects, this fact is more familiar to us from our infancy than any other, and strikes us as a fact which is necessary, and which could not have happened otherwise. Some writers have even gone so far as to pretend that, although the experiment had never been made, the communication of motion by impulse, might have been predicted by reasoning *à priori*.*

From the following passage, in one of Sir Isaac Newton's letters to Dr. Bentley, it appears that he supposed the communication of motion by impulse, to be a phenomenon much more explicable, than that a connexion should subsist between two bodies placed at a distance from each other, without any intervening medium. "It is inconceivable," says he, "that inanimate brute matter should, without "the mediation of something else which is not material, operate "upon, and affect other matter, without mutual contact; as it must "do, if gravitation, in the sense of Epicurus, be essential and inhe- "rent in it. And this is one reason why I desired that you would not "ascribe innate gravity to me. That gravity should be innate, in- "herent, and essential to matter, so that one body may act on ano- "ther, through a vacuum, without the mediation of any thing else, "by and through which their action and force may be conveyed "from one to another, is to me so great an absurdity, that I believe "no man who has, in philosophical matters, a competent faculty of "thinking, can ever fall into it."

With this passage I so far agree, as to allow that it is impossible to conceive in what manner one body acts on another at a distance, through a vacuum. But I cannot admit that it removes the difficulty to suppose, that the two bodies are in actual contact. That one body may be the efficient cause of the motion of another body placed at a distance from it, I do by no means assert; but only, that we have as good reason to believe that this may be possible, as to believe that any one natural event is the efficient cause of another.

I have been led into this very long disquisition concerning efficient and physical causes, in order to point out the origin of the common theories of perception; all of which appear to me to have taken rise from the same prejudice, which I have already remarked to have had so extensive an influence upon the speculations of natural philosophers.

That, in the case of the perception of distant objects, we are naturally inclined to suspect, either something to be emitted from the object to the organ of sense, or some medium to intervene between the object and organ, by means of which the former may communicate an impulse to the latter, appears from the common modes of expression on the subject, which are to be found in all languages. In our own, for example, we frequently hear the vulgar speak, of light striking the eye, not in consequence of any philosophical theory they have been taught, but of their own crude and undirected speculations. Perhaps there are few men among those who have attended at all to the history of their own thoughts, who will not recollect the influence of these ideas, at a period of life long prior to the date of their philosophical studies. Nothing, indeed, can be conceived more simple and natural than their origin.

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* See an Answer to Lord Kaims's Essay on Motion; by John Stewart, M. D.

When an object is placed in a certain situation with respect to a particular organ of the body, a perception arises in the mind; when the object is removed, the perception ceases.[*] Hence we are led to apprehend some connexion between the object and the perception; and as we are accustomed to believe, that matter produces its effects by impulse, we conclude that there must be some material medium intervening between the object and organ, by means of which the impulse is communicated from the one to the other. That this is really the case, I do not mean to dispute. I think, however, it is evident, that the existence of such a medium does not in any case appear *à priori;* and yet the natural prejudices of men have given rise to an universal belief of it, long before they were able to produce any good arguments in support of their opinion.

Nor is it only to account for the connexion between the object and the organ of sense, that philosophers have had recourse to the theory of impulse. They have imagined, that the impression on the organ of sense is communicated to the mind in a similar manner. As one body produces a change in the state of another by impulse, so it has been supposed, that the external object produces perception, (which is a change in the state of the mind,) first, by some material impression made on the organ of sense; and, secondly, by some material impression communicated from the organ to the mind along the nerves and brain. These suppositions, indeed, as I had occasion already to hint, were, in the ancient theories of perception, rather implied than expressed; but by modern philosophers, they have been stated in the form of explicit propositions. "As to the manner," says Mr. Locke, "in which bodies produce ideas in us, "it is manifestly by impulse, the only way which we can conceive "bodies operate in."[†] And Sir Isaac Newton, although he does not speak of an *impulse* made on the mind, plainly proceeded on the principle that, as matter can move matter only by impulse, so no connexion could be carried on between matter and mind, unless the mind were *present* (as he expresses it) to the matter from which the last impression is communicated. "Is not" (says he) "the sensorium of animals, the place where the sentient substance is present; "and to which the sensible species of things are brought, through "the nerves and brain, that there they may be perceived by the "mind present in that place?" Dr. Clarke has expressed the same idea still more confidently, in the following passage of one of his letters to Leibnitz.—"Without being present[‡] to the images of the

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[*] Tum porro varios rerum sentimus odores,
Nec tamen ad nareis venienteis cernimus unquam:
Nec calidos aestus tuimur, nec frigora quimus
Usurpare oculis, nec voces cernere suemus;
Quae tamen omnia corporeâ constare necesse 'st
Naturâ; quoniam sensus impellere possunt.
LUCRET. lib. i. p. 290.

[†] Essay on Human Understanding, book ii. chap. viii. § 11.

[‡] This phrase of "the soul *being present* to the images of external objects," has been used by many philosophers, since the time of Des Cartes; evidently from a desire to avoid

“things perceived, the soul could not possibly perceive them. A living substance can only there perceive, where it is present. Nothing can any more act, or be acted upon, *where* it is not present, than it can *when* it is not.” “How body acts upon mind, or mind upon body,” (says Dr. Porterfield,[*]) “I know not; but this I am very certain of, that nothing can act, or be acted upon, where it is not; and therefore, our mind can never perceive any thing but its own proper modifications, and the various states of the sensorium, to which it is present: so that it is not the external sun and moon, which are in the heavens, which our mind perceives, but only their image or representation, impressed upon the sensorium. How the soul of a seeing man sees these images, or how it receives those ideas, from such agitations in the sensorium, I know not; but I am sure it can never perceive the external bodies themselves, to which it is not present.”

[†] The same train of thinking, which had led these philosophers to suppose, that external objects are perceived by means of species proceeding from the object to the mind, or by means of some material impression made on the mind by the brain, has suggested to a late writer a very different theory; that the mind, when it perceives an external object, quits the body, and is present to the object of perception. “The mind,” (says the learned author of Ancient Metaphysics,) “is not where the body is, when it perceives what is distant from the body, either in time or place; because nothing can act, but when, and where, it is. Now, the mind acts when it perceives. The mind, therefore, of every animal who has memory or imagination, acts, and by consequence exists, when and where the body is not; for it perceives objects distant from the body both in time and place.”[‡] Indeed, if we take for granted, that in perception the mind acts upon the object, or the object upon the mind, and, at the same time, admit the truth of the maxim, that “nothing

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the absurdity of supposing, that images of extension and figure can exist in an unextended mind.

“Quaeris,” (says Des Cartes himself, in replying to the objects of one of his antagonists) “Quomodo existimem in me subjecto inextenso recipi posse speciem, ideamve corporis quod extensum est? Respondeo, nullam speciem corpoream in mente recipi, sed puram intellectionem tam rei corporeae quam incorporeae fieri absque ulla specie corporea; ad imaginationem vero, quae non nisi de rebus corporeis esse potest, opus quidem esse specie quae sit verum corpus, et *ad quam mens se applicet*, sed non quae in mente recipiatur.” It appears, therefore, that this philosopher supposed his images, or ideas, to exist in the *brain*, and not in the *mind*. Mr. Locke's expressions sometimes imply the one supposition, and sometimes the other.

[*] See his Treatise on the Eye, vol. ii. p. 356.

[†] “The slightest philosophy” (says Mr. Hume) “teaches us, that nothing can ever be present to the mind, but an image, or perception; and that the senses are only the inlets through which these images are conveyed; without being able to produce any immediate intercourse between the mind and the object. The table, which we see, seems to diminish, as we remove farther from it: but the real table, which exists independent of us, suffers no alteration: it was, therefore, nothing but its image which was present to the mind. These (he adds) are the obvious dictates of reason.”

ESSAY on the ACADEMICAL or SCEPTICAL PHILOSOPHY.

[‡] Ant. Met. vol. ii. p. 306.

can act but where it is," we must, of necessity, conclude, either that objects are perceived in a way similar to what is supposed in the ideal theory, or that, in every act of perception, the soul quits the body, and is present to the object perceived. And accordingly, this alternative is expressly stated by Malebranche; who differs, however, from the writer last quoted, in the choice which he makes of his hyphothesis, and even rests his proof of its truth on the improbability of the other opinion. "I suppose," says he, "that every one "will grant, that we perceive not external objects immediately, and "of themselves. We see the sun, the stars, and an infinity of ob"jects without us; and it is not at all likely that, upon such occa"sions, the soul sallies out of the body, in order to be present to the "objects perceived. She sees them not therefore by themselves; "and the immediate object of the mind is not the thing perceived, "but something which is intimately united to the soul; and it is "that which I call an idea: so that by the word idea, I understand "nothing else here, but that which is nearest to the mind when we "perceive any object.—It ought to be carefully observed, that, in "order to the mind's perceiving any object, it is absolutely neces"sary that the idea of that object be actually present to it. "Of this it is not possible to doubt. The things which the soul "perceives, are of two kinds. They are either in the soul, or "they are without the soul. Those that are in the soul, are its "own thoughts; that is to say, all its different modifications. The "soul has no need of ideas for perceiving these things. But with re"gard to things without the soul, we cannot perceive them but by "means of ideas."

To these quotations, I shall add another, which contains the opinion of Buffon upon the subject. As I do not understand it so completely, as to be able to translate it in a manner intelligible to myself, I shall transcribe it in the words of the author.

"L'ame s'unit intimement à tel objet qu'il lui plâit, la distance, "la grandeur, la figure, rien ne peut nuire à cette union lorsque "l'ame la veut: elle se fait et se fait en un instant .... la volonté "n'est elle donc qu'un mouvement corporel, et la contemplation un "simple attouchement? Comment cet attouchement pourroit-il se "faire sur un objet éloigné, sur un sujet abstrait? Comment pourroit"il s'opérer en un instant indivisible? A-t-on jamais conçu du "mouvement, sans qu'il y eût de l'espace et du tems? La volonté, "si c'est un mouvement, n'est donc pas un mouvement matériel, et "si l'union de l'ame à son objet est un attouchement, un contact, cet "attouchement ne se fait-il pas au loin? ce contact n'est il pas une "pénétration?"

All these theories appear to me to have taken rise, first, from an inattention to the proper object of philosophy, and an application of the same general maxims to physical and to efficient causes; and secondly, from an apprehension, that we understand the connexion between impulse and motion, better than any other physical fact. From the detail which I have given, it appears how extensive an influence this prejudice has had on the inquiries both of natural philosophers and of metaphysicians.

In the foregoing reasonings, I have taken for granted, that motion may be produced by impulse; and have contented myself with asserting, that this fact is not more explicable, than the motions which the Newtonians refer to gravitation; or than the intercourse which is carried on between the mind and external objects in the case of perception. The truth, however, is, that some of the ablest philosophers in Europe are now satisfied, not only that there is no evidence of motion being in any case produced by the actual contact of two bodies; but that very strong proofs may be given of the absolute impossibility of such a supposition; and hence they have been led to conclude, that all the effects, which are commonly referred to impulse, arise from a power of repulsion, extending to a small and imperceptible distance round every element of matter. If this doctrine shall be confirmed by future speculations in physics, it must appear to be a curious circumstance in the history of science, that philosophers have been so long occupied in attempting to trace all the phenomena of matter, and even some of the phenomena of mind, to a general fact, which, upon an accurate examination, is found to have no existence.——I do not make this observation with a view to depreciate the labours of these philosophers; for, although the system of Boscovich were completely established, it would not diminish, in the smallest degree, the value of those physical inquiries, which have proceeded on the common hypothesis, with respect to impulse. The laws which regulate the communication of motion, in the case of apparent contact, are the most general facts we observe among the terrestrial phenomena; and they are, of all physical events, those which are the most familiar to us from our earliest infancy. It was therefore not only natural but proper, that philosophers should begin their physical inquiries, with attempting to refer to *these*, (which are the most general laws of nature, exposed to the examination of our senses,) the particular appearances they wished to explain. And if ever the theory of Boscovich should be completely established, it will have no other effect, than to resolve these laws into some principle still more general, without affecting the solidity of the common doctrine, so far as it goes.

SECTION III.

Of Dr. Reid's Speculations on the Subject of Perception.

It was chiefly in consequence of the sceptical conclusions which Bishop Berkeley and Mr. Hume had deduced from the ancient theories of perception, that Dr. Reid was led to call them in question; and he appears to me to have shewn, in the most satisfactory manner, not only that they are perfectly hypothetical, but that the suppositions, they involve, are absurd and impossible. His reasonings, on this part of our constitution, undoubtedly form the most important accession which the philosophy of the human mind has received since the time of Mr. Locke.

But although Dr. Reid has been at much pains to overturn the old ideal system, he has not ventured to substitute any hypothesis of his own in its place. And, indeed, he was too well acquainted with the limits prescribed to our philosophical inquiries, to think of indulging his curiosity in such unprofitable speculations. All, therefore, that he is to be understood as aiming at, in his inquiries concerning our perceptive powers, is, to give a precise state of the fact, divested of all theoretical expressions; in order to prevent philosophers from imposing on themselves any longer, by words without meaning, and to extort from them an acknowledgment, that, with respect to the process of nature in perception, they are no less ignorant than the vulgar.

According to this view of Dr. Reid's reasonings on the subject of perception, the purpose to which they are subservient may appear to some to be of no very considerable importance; but the truth is, that one of the most valuable effects of genuine philosophy, is to remind us of the limited powers of the human understanding, and to revive those natural feelings of wonder and admiration at the spectacle of the universe, which are apt to languish in consequence of long familiarity. The most profound discoveries which are placed within the reach of our researches lead to a confession of human ignorance; for, while they flatter the pride of man, and increase his power, by enabling him to trace the simple and beautiful laws by which physical events are regulated, they call his attention, at the same time, to those general and ultimate facts which bound the narrow circle of his knowledge; and which, by evincing to him the operation of powers, whose nature must for ever remain unknown, serve to remind him of the insufficiency of his faculties to penetrate the secrets of the universe. Wherever we direct our inquiries; whether to the anatomyand physiology of animals, to the growth of vegetables, to the chemical attractions and repulsions, or to the motions of the heavenly bodies, we perpetually perceive the effects of powers which cannot belong to matter. To a certain length we are able to proceed; but in every research, we meet with a line, which no industry nor ingenuity can pass. It is a line too, which is marked with sufficient distinctness, and which no man now thinks of passing, who has just views of the nature and object of philosophy. It forms the separation between that field which falls under the survey of the physical inquirer, and that unknown region, of which, though it was necessary that we should be assured of the existence, in order to lay a foundation for the doctrines of natural theology, it hath not pleased the Author of the universe to reveal to us the wonders, in this infant state of our being. It was, in fact, chiefly by tracing out this line, that Lord Bacon did so much service to science.

Beside this effect, which is common to all our philosophical pursuits, of impressing the mind with a sense of that mysterious agency.

or efficiency, into which general laws must be resolved, they have a tendency, in many cases, to counteract the influence of habit, in weakening those emotions of wonder and of curiosity, which the appearances of nature are so admirably fitted to excite. For this purpose, it is necessary, either to lead the attention to facts which are calculated to strike by their novelty, or to present familiar appearances in a new light: and such are the obvious effects of philosophical inquiries; sometimes extending our views to objects which are removed from vulgar observation, and sometimes correcting our first apprehensions with respect to ordinary events.—The communication of motion by impulse, (as I already hinted,) is as unaccountable as any phenomenon we know; and yet, most men are disposed to consider it as a fact which does not result from will, but from necessity. To such men, it may be useful to direct their attention to the universal law of gravitation; which, although not more wonderful in itself, than the common effects of impulse, is more fitted, by its novelty, to awaken their attention, and to excite their curiosity. If the theory of Boscovich should ever be established on a satisfactory foundation, it would have this tendency in a still more remarkable degree, by teaching us that the communication of motion by impulse, (which we are apt to consider as a necessary truth,) has no existence whatever; and that every case in which it appears to our senses to take place, is a phenomenon no less inexplicable, than that principle of attraction which binds together the most remote parts of the universe.

If such, however, be the effects of our philosophical pursuits when successfully conducted, it must be confessed that the tendency of imperfect or erroneous theories is widely different. By a specious solution of insuperable difficulties, they so dazzle and bewilder the understanding, as, at once, to prevent us from advancing, with steadiness, towards the limit of human knowledge, and from perceiving the existence of a region beyond it, into which philosophy is not permitted to enter. In such cases, it is the business of genuine science to unmask the imposture, and to point out clearly, both to the learned and to the vulgar, what reason can, and what she cannot, accomplish. This, I apprehend, has been done, with respect to the history of our perceptions, in the most satisfactory manner, by Dr. Reid.—When a person little accustomed to metaphysical speculations is told, that, in the case of volition, there are certain invisible fluids, propagated from the mind to the organ which is moved; and that, in the case of perception, the existence and qualities of the external object are made known to us by means of species, or phantasms, or images, which are present to the mind in the sensorium; he is apt to conclude, that the intercourse between mind and matter is much less mysterious than he had supposed; and that, although these expressions may not convey to him any very distinct meaning, their import is perfectly understood by philosophers. It is now, I think, pretty generally acknowledged by physiologists, that the influence of the will over the body, is a mystery which has never yet been unfolded; but, singular as it may appear, Dr. Reid was the first person who had courage to lay completely aside all the common hypothetical language concerning perception, and to exhibit the difficulty in all its magnitude, by a plain statement of the fact. To what then, it may be asked, does this statement amount?—Merely to this; that the mind is so formed, that certain impressions produced on our organs of sense by external objects, are followed by correspondent sensations; and that these sensations, (which have no more resemblance to the qualities of matter, than the words of a language have to the things they denote,) are followed by a perception of the existence and qualities of the bodies by which the impressions are made; that all the steps of this process are equally incomprehensible; and that, for any thing we can prove to the contrary, the connexion between the sensation and the perception, as well as that between the impression and the sensation, may be both arbitrary: that it is therefore by no means impossible, that our sensations may be merely the occasions on which the correspondent perceptions are excited; and that, at any rate, the consideration of these sensations, which are attributes of mind, can throw no light on the manner in which we acquire our knowledge of the existence and qualities of body. From this view of the subject, it follows, that it is external objects themselves, and not any species or images of these objects, that the mind perceives; and that although, by the constitution of our nature, certain sensations are rendered the constant antecedents of our perceptions, yet it is just as difficult to explain how our perceptions are obtained by their means, as it would be, upon the supposition, that the mind were all at once inspired with them, without any concomitant sensations whatever.

These remarks are general, and apply to all our various perceptions; and they evidently strike at the root of all the common theories upon the subject. The laws, however, which regulate these perceptions, are different in the case of the different senses, and form a very curious object of philosophical inquiry.—Those, in particular, which regulate the acquired perceptions of sight, lead to some very interesting and important speculations; and, I think, have never yet been explained in a manner completely satisfactory. To treat of them in detail, does not fall under the plan of this work; but I shall have occasion to make a few remarks on them, in the chapter on Conception

In opposition to what I have here observed on the importance of Dr. Reid's speculations concerning our perceptive powers, I am sensible it may be urged, that they amount merely to a negative discovery; and it is possible, that some may even be forward to remark, that it was unnecessary to employ so much labour and ingenuity as he has done, to overthrow an hypothesis of which a plain account would have been a sufficient refutation.—To such persons I would beg leave to suggest, that although, in consequence of the juster views in pneumatology, which now begin to prevail, (chiefly, I believe, in consequence of Dr. Reid's writings,) the ideal system may appear to many readers unphilosophical and puerile; yet the case was very different when this author entered upon his inquiries: and I may even venture to add, that few positive discoveries, in the whole history of science, can be mentioned, which found a juster claim to literary reputation, than to have detected, so clearly and unanswerably, the fallacy of an hypothesis, which has descended to us from the earliest ages of philosophy; and which, in modern times, has not only served to Berkeley and Hume as the basis of their sceptical systems, but was adopted as an indisputable truth by Locke, by Clarke, and by Newton.

SECTION IV.

Of the Origin of our Knowledge.

The philosophers who endeavour to explain the operations of the human mind by the theory of ideas, and who took for granted, that in every exertion of thought there exists in the mind some object distinct from the thinking substance, were naturally led to inquire whence these ideas derive their origin; in particular, whether they are conveyed to the mind from without by means of the senses, or form part of its orignal furniture?

With respect to this question, the opinions of the ancients were various; but as the influence of these opinions on the prevailing systems of the present age is not very considerable, it is not necessary for any of the purposes I have in view in this work, to consider them particularly. The moderns, too, have been much divided on the subject; some holding with Des Cartes, that the mind is furnished with certain innate ideas; others, with Mr. Locke, that all our ideas may be traced from sensation and reflection; and many, (*especially* among the later metaphysicians in France,) that they may be all traced from sensation alone.

Of these theories, that of Mr. Locke deserves more particularly our attention; as it has served as the basis of most of the metaphysical systems which have appeared since his time; and as the difference between it and the theory which derives all our ideas from sensation alone, is rather apparent than real.

In order to convey a just notion of Mr. Locke's doctrine concerning the origin of our ideas, it is necessary to remark, that he refers to sensation all the ideas, which we are supposed to receive by the external senses, our ideas, for example, of colours, of sounds, of hardness, of extension, of motion, and in short, of all the qualities and modes of matter; to reflection, the ideas of our own mental operations which we derive from consciousness; our ideas, for example, of memory, of imagination, of volition, of pleasure, and of pain. These two sources, according to him, furnish us with all our simple ideas, and the only power which the mind possesses over them, is to perform certain operations, in the way of composition, abstraction, generalization, &c. on the materials which it thus collects in the course of its experience. The laudable desire of Mr. Locke, to introduce precision and perspicuity into metaphysical speculations, and his anxiety to guard the mind against errour in general, naturally prepossessed him in favour of a doctrine, which, when compared with those of his predecessors, was intelligible and simple, and which, by suggesting a method, apparently easy and palpable, of analyzing our knowledge into its elementary principles, seemed to furnish an antidote against those prejudices which had been favoured by the hypothesis of innate ideas. It is now a considerable time since this fundamental principle of Mr. Locke's system began to lose its authority in England; and the sceptical conclusions, which it had been employed to support by some later writers, furnished its opponents with very plausible arguments against it. The late learned Mr. Harris, in particular, frequently mentions this doctrine of Mr. Locke, and always in terms of high indignation. "Mark," (says he, in one passage,) "the order of things, according to the account of our later "metaphysicians. First, comes that huge body, the sensible world. "Then this, and its attributes beget sensible ideas. Then, out "of sensible ideas, by a kind of lopping and pruning, are made ideas "intelligible, whether specific or general. Thus, should they admit that mind was coëval with body; yet, till body gave it ideas, "and awakened its dormant powers, it could at best have been nothing more than a sort of dead capacity; for innate ideas it could "not possibly have any." And, in another passage: "For my own "part, when I read the detail about sensation and reflection, and am "taught the process at large how my ideas are all generated, I seem "to view the human soul in the light of a crucible, where truths are "produced by a kind of logical chemistry."

If Dr. Reid's reasonings on the subject of ideas be admitted, all these speculations with respect to their origin fall to the ground, and the question to which they relate, is reduced merely to a question of fact, concerning the occasions on which the mind is first led to form those simple notions, into which our thoughts may be analyzed, and which may be considered as the principles or elements of human knowledge. With respect to many of these notions, this inquiry involves no difficulty. No one, for example, can be at a loss to ascertain the occasions on which the notions of colours and sounds are first formed by the mind: for these notions are confined to individuals who are possessed of particular senses, and cannot, by any combination of words, be conveyed to those who never enjoyed the use of them. The history of our notions of extension and figure, (which may be suggested to the mind by the exercise either of sight or of touch,) is not altogether so obvious; and accordingly, it has been the subject of various controversies. To trace the origin of these, and of our other simple notions with respect to the qualities of matter, or, in other words, to describe the occasions on which, by the laws of our nature, they are suggested to the mind, is one of the leading objects of Dr. Reid's inquiry, in his analysis of our external senses; in which he carefully avoids every hypothesis with respect to the inexplicable phenomena of perception and of thought, and confines himself scrupulously to a literal statement of facts.—Similar inquiries to these may be proposed, concerning the occasions on which we form the notions of *time*, of *motion*, of *number*, of *causation*, and an infinite variety of others. Thus, it has been observed by different authors, that every perception of change suggests to the mind the notion of a *cause*, without which that change could not have happened. Dr. Reid remarks, that, without the faculty of memory, our perceptive powers could never have led us to form the idea of *motion*. I shall afterwards shew, in the sequel of this work, that without the same faculty of memory, we never could have formed the notion of *time*; and that without the faculty of abstraction, we could not have formed the notion of *number*.—Such inquiries, with respect to the origin of our knowledge, are curious and important, and if conducted with judgment, they may lead to the most certain conclusions; as they aim at nothing more than to ascertain facts, which although not obvious to superficial observers, may yet be discovered by patient investigation.

From the remarks which have been just made on our notions of time, of motion, and of number, it is evident, that the inquiry concerning the origin of human knowledge cannot possibly be discussed at the commencement of such a work as this; but that it must be resumed in different parts of it, as those faculties of the mind come under our view, with which the formation of our different simple notions is connected.

With respect to the general question, Whether all our knowledge may be ultimately traced from our sensations? I shall only observe at present, that the opinion we form concerning it is of much less consequence than is commonly supposed. That the mind cannot, without the grossest absurdity, be considered in the light of a receptacle which is gradually furnished from without, by materials introduced by the channel of the senses, nor in that of a *tabula rasa*, upon which copies or resemblances of things external are imprinted, I have already shewn at sufficient length. Although, therefore, we should acquiesce in the conclusion, that, without our organs of sense, the mind must have remained destitute of knowledge, this concession could have no tendency whatever to favour the principles of materialism; as it implies nothing more, than that the impressions, made on our senses by external objects, furnish the occasions, on which the mind, by the laws of its constitution, is led to perceive the qualities of the material world, and to exert all the different modifications of thought of which it is capable.

From the very slight view of the subject, however, which has been already given, it is sufficiently evident, that this doctrine, which refers the origin of all our knowledge to the occasions furnished by sense, must be received with many limitations. That those ideas, which Mr. Locke calls ideas of reflection, (or, in other words, the notions which we form of the subjects of our own consciousness,) are not suggested to the mind immediately by the sensations arising from the use of our organs of perception, is granted on all hands: and, therefore, the amount of the doctrine now mentioned, is nothing more than this; that the first occasions on which our various intellectual faculties are exercised, are furnished by the impressions made on our organs of sense, and consequently, that, without these impressions, it would have been impossible for us to arrive at the knowledge of our faculties. Agreeably to this explanation of the doctrine, it may undoubtedly be said with plausibility, (and, I am inclined to believe, with truth,) that the occasions on which all our notions are formed, are furnished either immediately or ultimately by sense; but, if I am not much mistaken, this is not the meaning which is commonly annexed to the doctrine, either by its advocates or their opponents. One thing at least is obvious, that, in this sense, it does not lead to those consequences which have interested one party of philosophers in its defence, and another in its refutation.

There is another very important consideration which deserves our attention in this argument: that, even on the supposition, that certain impressions on our organs of sense are necessary to awaken the mind to a consciousness of its own existence, and to give rise to the exercise of its various faculties, yet all this might have happened, without our having any knowledge of the qualities, or even of the existence, of the material world. To facilitate the admission of this proposition, let us suppose a being formed in every other respect like man, but possessed of no senses, excepting those of hearing and smelling. I make choice of these two senses, because it is obvious, that by means of them alone we never could have arrived at the knowledge of the primary qualities of matter, or even of the existence of things external. All that we could possibly have inferred from our occasional sensations of smell and sound, would have been, that there existed some unknown cause by which they were produced.

Let us suppose then a particular sensation to be excited in the mind of such a being. The moment this happens, he must necessarily acquire the knowledge of two facts at once: that of the existence of *the sensation*, and that of *his own existence*, as a sentient being. After the sensation is at an end, he can *remember* he felt it; he can *conceive* that he feels it again. If he has felt a variety of different sensations, he can compare them together in respect of the pleasure or the pain they have afforded him, and will naturally *desire* the return of the agreeable sensations, and be *afraid* of the return of those which were painful. If the sensations of smell and sound are both excited in his mind at the same time, he can *attend* to either of them he chooses, and withdraw his attention from the other, or he can withdraw his *attention* from both, and fix it on some sensation he has felt formerly. In this manner, he might be led, merely by sensations existing in his mind, and conveying to him no information concerning matter, to exercise many of his most important faculties; and amidst all these different modifications and operations of his mind, he would feel, with irresistible conviction, that they all belong to one and the same sentient and intelligent being, or, in other words, that they are all modifications and operations of himself.—I say nothing, at present, of the various simple notions, (or simple ideas, as they are commonly called,) which would arise in his mind; for example, the ideas of *number*, of *duration*, of *cause and effect*, of *personal identity*; all of which, though perfectly unlike his sensations, could not fail to be suggested by means of them. Such a being, then, might know all that we know of mind at present, and as his language would be appropriated to mind solely, and not borrowed by analogy from material phenomena, he would even possess important advantages over us in conducting the study of pneumatology.

From these observations it sufficiently appears, what is the real amount of the celebrated doctrine, which refers the origin of all our knowledge to our sensations; and that, even granting it to be true, (which, for my own part, I am disposed to do, in the sense in which I have now explained it,) it would by no means follow from it, that our notions of the operations of mind, nor even many of those notions which are commonly suggested to us, *in the first instance*, by the perception of external objects, are *necessarily subsequent* to our knowledge of the qualities, or even of the existence, of matter.

The remarks which I have offered on this doctrine will not appear superfluous to those who recollect that, although it has, for many years past, been a subject of controversy in England, it continues still to be implicitly adopted by the best philosophical writers in France; and that it has been employed by some of them to support the system of materialism, and by others to shew, that the intellectual distinctions between man and brutes arise entirely from the differences in their animal organization, and in their powers of external perception.

CHAPTER SECOND.

OF ATTENTION.

When we are deeply engaged in conversation, or occupied with any speculation that is interesting to the mind, the surrounding objects either do not produce in us the perceptions they are fitted to excite, or these perceptions are instantly forgotten. A clock, for example, may strike in the same room with us, without our being able, next moment, to recollect whether we heard it or not.

In these, and similar cases, I believe, it is commonly taken for granted, that we really do not perceive the external object. From some analogous facts, however, I am inclined to suspect that this opinion is not well founded. A person who falls asleep at church, and is suddenly awaked, is unable to recollect the last words spoken by the preacher; or even to recollect that he was speaking at all. And yet, that sleep does not suspend entirely the powers of perception, may be inferred from this, that if the preacher were to make a sudden pause in his discourse, every person in the congregation, who was asleep, would instantly awake. In this case, therefore, it appears, that a person may be conscious of a perception, without being able afterwards to recollect it.

Many other instances of the same general fact might be produced. When we read a book, (especially in a language which is not perfectly familiar to us,) we must perceive successively every different letter, and must afterwards combine these letters into syllables and words, before we comprehend the meaning of a sentence. This process, however, passes through the mind, without leaving any trace in the memory.

It has been proved by optical writers, that, in perceiving the distances of visible objects from the eye, there is a judgment of the understanding antecedent to the perception. In some cases this judgment is founded on a variety of circumstances combined together; the conformation of the organ necessary for distinct vision; the inclination of the optic axes; the distinctness or indistinctness of the minute parts of the object; the distances of the intervening objects from each other, and from the eye; and, perhaps, on other circumstances besides these: and yet, in consequence of our familiarity with such processes from our earliest infancy, the perception seems to be instantaneous; and it requires much reasoning, to convince persons unaccustomed to philosophical speculations, that the fact is otherwise.

Another instance of a still more familiar nature, may be of use for the farther illustration of the same subject. It is well known, that our thoughts do not succeed each other at random, but according to certain laws of association, which modern philosophers have been at much pains to investigate. It frequently, however, happens, particularly when the mind is animated by conversation, that it makes a sudden transition from one subject to another, which, at first view, appears to be very remote from it; and that it requires a considerable degree of reflection, to enable the person himself by whom the transition was made, to ascertain what were the intermediate ideas. A curious instance of such a sudden transition is mentioned by Hobbes in his Leviathan. "In a company," (says he,) "in which the "conversation turned on the civil war, what could be conceived "more impertinent, than for a person to ask abruptly, What was the "value of a Roman denarius? On a little reflection, however, I "was easily able to trace the train of thought which suggested the question: for the original subject of discourse naturally introduced the history of the King, and of the treachery of those who surrendered his person to his enemies; this again introduced the treachery of Judas Iscariot, and the sum of money which he received for his reward.—And all this train of ideas," (says Hobbes,) "passed through the mind of the speaker in a twinkling, in consequence of the velocity of thought." It is by no means improbable, that if the speaker himself had been interrogated about the connexion of ideas, which led him aside from the original topic of discourse, he would have found himself, at first, at a loss for an answer.

In the instances which have been last mentioned, we have also a proof, that a perception, or an idea, which passes through the mind without leaving any trace in the memory, may yet serve to introduce other ideas connected with it by the laws of association. Other proofs of this important fact shall be mentioned afterwards.

When a perception or an idea passes through the mind, without our being able to recollect it next moment, the vulgar themselves ascribe our want of memory to a want of attention. Thus, in the instance already mentioned, of the clock, a person, upon observing that the minute hand had just passed twelve, would naturally say, that he did not attend to the clock when it was striking. There seems, therefore, to be a certain effort of the mind upon which, even in the judgment of the vulgar, memory in some measure depends; and which they distinguish by the name of attention.

The connexion between attention and memory has been remarked by many authors. "Nec dubium est," (says Quinctilian, speaking of memory,) "quin plurimum in hac parte valeat mentis intentio, et velut acies luminum a prospectu rerum quas intuetur non aversa."

The same observation has been made by Locke,[*] and by most of the writers on the subject of education.

But although the connexion between attention and memory has been frequently remarked in general terms, I do not recollect that the power of attention has been mentioned by any of the writers on pneumatology, in their enumeration of the faculties of the mind;[†] nor has it been considered by any one, so far as I know, as of sufficient importance to deserve a particular examination. Helvetius, indeed, in his very ingenious work, *de l'Esprit*, has entitled one of his

[*] "Memory depends much on attention and repetition." Locke's Essay, b. i. chap. x.

[†] Some important observations on the subject of attention occur in different parts of Dr. Reid's writings, particularly in his Essays on the Intellectual Powers of Man, p. 62; and in his Essays on the Active Powers of Man, p. 78, et seq.—To this ingenious author we are indebted for the remark, that attention to things external, is properly called *observation*; and attention to the subjects of our consciousness, *reflection*. He has also explained the causes of the peculiar difficulties which accompany this last exertion of the mind, and which form the chief obstacles to the progress of pneumatology. I shall have occasion, in another part of this work, to treat of habits of inattention in general, and to suggest some practical hints with respect to the culture both of the powers of observation and reflection. The view which I propose to take of attention at present, is extremely limited; and is intended merely to comprehend such general principles as are necessary to prepare the reader for the chapters which are to follow.

chapters, *De l'inegale capacité d'Attention*; but what he considers under this article, is chiefly that capacity of patient inquiry, (or as he calls it, *une attention suivie*) upon which philosophical genius seems in a great measure to depend. He has also remarked,* with the writers already mentioned, that the impression which any thing makes on the memory depends much on the degree of attention we give to it; but he has taken no notice of that effort which is absolutely essential to the lowest degree of memory. It is this effort that I propose to consider at present;—not those different degrees of attention which imprint things more or less deeply on the mind, but that act or effort, without which we have no recollection or memory whatever.

With respect to the nature of this effort, it is perhaps impossible for us to obtain much satisfaction. We often speak of greater and less degrees of attention; and, I believe, in these cases, conceive the mind (if I may use the expression) to exert itself with different degrees of energy. I am doubtful, however, if this expression conveys any distinct meaning. For my own part, I am inclined to suppose, (though I would by no means be understood to speak with confidence,) that it is essential to memory, that the perception or the idea, that we would wish to remember, should remain in the mind for a certain space of time, and should be contemplated by it exclusively of every thing else; and that attention consists partly, (perhaps entirely) in the effort of the mind, to detain the idea or the perception, and to exclude the other objects that solicit its notice.

Notwithstanding, however, the difficulty of ascertaining in what this act of the mind consists, every person must be satisfied of its reality from his own consciousness; and of its essential connexion with the power of memory. I have already mentioned several instances of ideas passing through the mind, without our being able to recollect them next moment. These instances were produced, merely to illustrate the meaning I annex to the word Attention; and to recall to the recollection of the reader a few striking cases, in which the possibility of our carrying on a process of thought, which we are unable to attend to at the time, or to remember afterwards, is acknowledged in the received systems of philosophy. I shall now mention some other phenomena, which appear to me to be very similar to these, and to be explicable in the same manner; although they have commonly been referred to very different principles.

The wonderful effect of practice in the formation of habits, has been often and justly taken notice of, as one of the most curious circumstances in the human constitution. A mechanical operation, for example, which we at first performed with the utmost difficulty, comes, in time, to be so familiar to us, that we are able to perform it without the smallest danger of mistake; even while the attention appears to be completely engaged with other subjects. The truth seems to be, that in consequence of the association of ideas, the different steps of the process present themselves successively to the thoughts, without any recollection on our part, and with a degree of rapidity proportioned to the length of our experience; so as to save us entirely the trouble of hesitation and reflection, by giving us every moment a precise and steady notion of the effect to be produced.[*]

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* "C'est l'attention, plus ou moins grande, qui grave plus ou moins profondément les objets dans la memoire."

In the case of some operations which are very familiar to us, we find ourselves unable to attend to, or to recollect, the acts of the will by which they were preceded; and accordingly, some philosophers of great eminence have called in question the existence of such volitions; and have represented our habitual actions as involuntary and mechanical. But surely the circumstance of our inability to recollect our volitions, does not authorize us to dispute their possibility; any more than our inability to attend to the process of the the mind, in estimating the distance of an object from the eye, authorizes us to affirm that the perception is instantaneous. Nor does it add any force to the objection to urge, that there are instances in which we find it difficult, or perhaps impossible, to check our habitual actions by a contrary volition. For it must be remembered, that this contrary volition does not remain with us steadily during the whole operation, but is merely a general intention or resolution, which is banished from the mind, as soon as the occasion presents itself with which the habitual train of our thoughts and volitions is associated.[†]

It may indeed be said, that these observations only prove the possibility that our habitual actions may be voluntary. But if this be admitted, nothing more can well be required; for surely, if these phenomena are clearly explicable from the known and acknowledged laws of the human mind, it would be unphilosophical to devise a new principle on purpose to account for them. The doctrine, therefore, which *I* have laid down with respect to the nature of habits, is by no means founded on hypothesis, as has been objected to me by some of my friends; but on the contrary, the charge of hypothesis falls on those who attempt to explain them, by saying that they are *mechanical* or *automatic*; a doctrine which, if it is at all intelligible, must be understood as implying the existence of some law of our constitution, which has been hitherto unobserved by philosophers; and to which, I believe, it will be difficult to find any thing analogous in our constitution.

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[*] I do not mean by this observation, to call in question the effects which the practice of the mechanical arts has on the muscles of the body. These are as indisputable as its effects on the mind. A man who has been accustomed to write with his right hand, can write better with his left hand than another who never practised the art at all; but he cannot write so well with his left hand as with his right.—The effects of practice, therefore, it should seem, are produced partly on the mind, and partly on the body.

[†] The solution of this difficulty which is given by Dr. Porterfield, is somewhat curious. "Such is the power of custom and habit, that many actions, which are no doubt voluntary, and proceed from our mind, are in certain circumstances rendered necessary, so as to appear altogether mechanical, and independent of our wills; but it does not from thence follow, that our mind is not concerned in such motions, but only that it has imposed upon itself a law, whereby it regulates and governs them to the greatest advantage. In all this, there is nothing of intrinsical necessity; the mind is at absolute liberty to act as it pleases; but being a wise agent, it cannot choose but to act in conformity to this law, by reason of the utility and advantage that arises from this way of acting." TREATISE ON THE EYE, vol. ii. p. 17.

In the foregoing observations, I have had in view a favourite doctrine of Dr. Hartley; which has been maintained also of late by a much higher authority, I mean Dr. Reid.

"Habit,"* (says this ingenious author,) "differs much from in-"stinct, not in its nature but in its origin; the last being natural, the "first acquired. Both operate without will or intention, without "thought, and therefore may be called mechanical principles." In another passage,† he expresses himself thus: "I conceive it to be "a part of our constitution, that what we have been accustomed "to do, we acquire not only a facility but a proneness to do on "like occasions; so that it requires a particular will or effort to for-"bear it, but to do it requires, very often, no will at all."

The same doctrine is laid down still more explicitly by Dr. Hartley.

"Suppose," (says he,) "a person who has a perfectly voluntary "command over his fingers, to begin to learn to play on the harpsi-"chord. The first step is to move his fingers from key to key, with "a slow motion, looking at the notes, and exerting an express act of "volition in every motion. By degrees the motions cling to one "another, and to the impressions of the notes, in the way of associa-"tion, so often mentioned, the acts of volition growing less and less "express all the time, till at last they become evanescent and im-"perceptible. For an expert performer will play from notes, or "ideas laid up in the memory, and at the same time carry on a quite "different train of thoughts in his mind; or even hold a conversa-"tion with another. Whence we may conclude, that there is no in-"tervention of the idea, or state of mind, called Will."‡ Cases of this sort Hartley calls "transitions of voluntary actions into automatic "ones."

I cannot help thinking it more philosophical to suppose, that those actions which are originally voluntary, always continue so; although, in the case of operations which are become habitual in consequence of long practice, we may not be able to recollect every different volition. Thus, in the case of a performer on the harpsichord, I apprehend, that there is an act of the will preceding every motion of every finger, although he may not be able to recollect these volitions afterwards; and although he may, during the time of his performance, be employed in carrying on a separate train of thought. For, it must be remarked, that the most rapid performer can, when he pleases, play so slowly, as to be able to attend to, and to recollect, every separate act of his will in the various movements of his fingers; and he can gradually accelerate the rate of his execution, till he is unable to recollect these acts. Now, in this instance, one of two suppositions must be made; the one is, that the operations in the two cases are carried on precisely in the same manner, and differ only in the degree of rapidity, and that when this rapidity exceeds a certain rate, the acts of the will are too momentary to leave any impression on the memory.—The other is, that when the rapidity exceeds a certain rate, the operation is taken entirely out of our hands; and is carried on by some unknown power, of the nature of which we are as ignorant, as of the cause of the circulation of the blood, or of the motion of the intestines.[*] The last supposition seems to me to be somewhat similar to that of a man who should maintain, that, although a body projected with a moderate velocity, is seen to pass through all the intermediate spaces in moving from one place to another, yet we are not entitled to conclude, that this happens when the body moves so quickly as to become invisible to the eye. The former supposition is supported by the analogy of many other facts in our constitution. Of some of these I have already taken notice; and it would be easy to add to the number.—An expert accountant, for example, can sum up, almost with a single glance of his eye, a long column of figures. He can tell the sum with unerring certainty, while, at the same time, he is unable to recollect any one of the figures of which that sum is composed; and yet nobody doubts, that each of these figures has passed through his mind; or supposes, that when the rapidity of the process becomes so great, that he is unable to recollect the various steps of it, he obtains the result by a sort of inspiration. This last supposition would be perfectly analogous to Dr. Hartley's doctrine concerning the nature of our habitual exertions.

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* Essays on the Active Powers of Man, p. 128.

† Ibid. p. 130.

‡ Vol. i. p. 108, 109.

The only plausible objection which, I think, can be offered to the principles I have endeavoured to establish on this subject, is founded on the astonishing, and almost incredible rapidity, they necessarily suppose in our intellectual operations.—When a person, for example, reads aloud; there must, according to this doctrine, be a separate volition preceding the articulation of every letter; and it has been found, by actual trial,[†] that it is possible to pronounce about two thousand letters in a minute. Is it reasonable to suppose, that the mind is capable of so many different acts in an interval of time so very inconsiderable?

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[*] This seems to have been the opinion of Bishop Berkeley, whose doctrine concerning the nature of our habitual actions, coincides with that of the two philosophers already quoted. "It must be owned, we are not conscious of the systole and diastole of the heart, or the motion of the diaphragm. It may not, nevertheless, be thence inferred, that unknowing nature can act regularly as well as ourselves. The true inference is, that the self-thinking individual, or human person, is not the real author of those natural motions. And, in fact, no man blames himself, if they are wrong, or values himself, if they are right. The same may be said of the fingers of a musician, which some object to be moved by habit, which understands not; it being evident that what is done by rule, must proceed from something that understands the rule; therefore, if not from the musician himself, from some other active intelligence; the same, perhaps, which governs bees and spiders, and moves the limbs of those who walk in their sleep."—See a Treatise, entitled, *Siris*, p. 123, 2d edit.

[†] Incredibili velocitate peraguntur et repetuntur musculorum contractiones. Docent cursus, præsertim quadrupedum; vel lingua, quæ quadringenta vocabula, forte bis mille

With respect to this objection, it may be observed, in the first place, that all arguments against the foregoing doctrine with respect to our habitual exertions, in so far as they are founded on the inconceivable rapidity which they suppose in our intellectual operations, apply equally to the common doctrine concerning our perception of distance by the eye. But this is not all. To what does the supposition amount, which is considered as so incredible? Only to this, that the mind is so formed, as to be able to carry on certain intellectual processes, in intervals of time too short to be estimated by our faculties; a supposition which, so far from being extravagant, is supported by the analogy of many of our most certain conclusions in natural philosophy. The discoveries made by the microscope have laid open to our senses a world of wonders, the existence of which hardly any man would have admitted upon inferiour evidence; and have gradually prepared the way for those physical speculations, which explain some of the most extraordinary phenomena of nature, by means of modifications of matter far too subtile for the examination of our organs. Why then should it be considered as unphilosophical, after having demonstrated the existence of various intellectual processes which escape our attention in consequence of their rapidity, to carry the supposition a little farther, in order to bring under the known laws of the human constitution, a class of mental operations, which must otherwise remain perfectly inexplicable? Surely, our ideas of time are merely relative, as well as our ideas of extension; nor is there any good reason for doubting, that, if our powers of attention and memory were more perfect than they are, so as to give us the same advantage in examining rapid events which the microscope gives for examining minute portions of extension, they would enlarge our views with respect to the intellectual world, no less, than that instrument has with respect to the material.

It may contribute to remove, still more completely, some of the scruples which are naturally suggested by the foregoing doctrine, to remark, that, as the great use of attention and memory is to enable us to treasure up the results of our experience and reflection for the future regulation of our conduct, it would have answered no purpose for the author of our nature to have extended their province to those intervals of time, which we have no occasion to estimate in the common business of life. All the intellectual processes I have mentioned are subservient to some particular end, either of perception or of action; and it would have been perfectly superfluous, if, after this end were gained, the steps which are instrumental in bringing it about were all treasured up in the memory. Such a constitu-

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literas, exprimit, spatio temporis quod *minutum* vocare solemus, quamvis ad multas literas exprimendas plures musculorum contractiones requirantur.

Conspectus Medicinæ Theoreticæ, Auct. Jac. Gregory,
Edit. altera, p. 171.

tion of our nature would have had no other effect but to store the mind with a variety of useless particulars.

After all I have said, it will perhaps be still thought, that some of the reasonings I have offered are too hypothetical; and it is even possible, that some may be disposed rather to dispute the common theory of vision, than admit the conclusions I have endeavoured to establish. To such readers the following considerations may be of use, as they afford a more palpable instance, than any I have yet mentioned, of the rapidity with which the thoughts may be trained by practice, to shift from one thing to another.

When an equilibrist balances a rod upon his finger, not only the attention of his mind, but the observation of his eye, is constantly requisite.—It is evident that the part of his body which supports the object is never wholly at rest; otherwise the object would no more stand upon it, than if placed in the same position upon a table. The equilibrist, therefore, must watch, in the very beginning, every inclination of the object from the proper position, in order to counteract this inclination by a contrary movement. In this manner, the object has never time to fall in any one direction, and is supported in a way somewhat analogous to that in which a top is supported on a pivot, by being made to spin upon an axis.—That a person should be able to do this in the case of a single object, is curious; but that he should be able to balance in the same way, two, or three, upon different parts of his body, and at the same time balance himself on a small cord or wire, is indeed wonderful. Nor is it possible to conceive that, in such an instance, the mind, at one and the same moment, attends to these different equilibriums; for it is not merely the attention which is requisite, but the eye. We must therefore conclude, that both of these are directed successively to the different equilibriums, but change from one object to another with such velocity, that the effect, with respect to the experiment, is the same as if they were directed to all the objects constantly.

It is worth while to remark farther, with respect to this last illustration, that it affords direct evidence of the possibility of our exerting acts of the will, which we are unable to recollect; for the movements of the equilibrist do not succeed each other in a regular order, like those of the harpsichord player, in performing a piece of music, but must in every instance be regulated by accidents, which may vary in numberless respects, and which indeed must vary in numberless respects, every time he repeats the experiment: and therefore, although, in the former case, we should suppose, with Hartley, "that the motions cling to one another, and "to the impressions of the notes, in the way of association, without "any intervention of the state of mind called will," yet, in this instance, even the possibility of such a supposition is directly contradicted by the fact.

The dexterity of jugglers, (which, by the way, merits a greater degree of attention from philosophers, than it has yet attracted,) affords many curious illustrations of the same doctrine. The whole of this art seems to me to be founded on this principle; that it is possible for a person, by long practice, to acquire a power, not only of carrying on certain intellectual processes more quickly than other men, (for all the feats of legerdemain suppose the exercise of observation, thought, and volition,) but of performing a variety of movements with the hand, before the eyes of a company, in an interval of time too short to enable the spectators to exert that degree of attention which is necessary to lay a foundation for memory.*

As some philosophers have disputed the influence of the will in the case of habits, so others, (particularly Stahl and his followers) have gone into the opposite extreme, by referring to the will all the vital motions. If it be admitted, (say these philosophers,) that there are instances in which we will an effect, without being able to make it an object of attention, is it not possible that, what we commonly call the vital and involuntary motions, may be the consequences of our own thought and volition? But there is surely a wide difference between those cases, in which the mind was at first conscious of thought and volition, and gradually lost the power of attending to them, from the growing rapidity of the intellectual process, and a case in which the effect itself is perfectly unknown to the bulk of mankind, even after they arrive at maturity, and in which this effect has continued to take place with the most perfect regularity, from the very beginning of their animal existence, and long before the first dawn of either reflection or experience.

Some of the followers of Stahl have stated the fact rather inaccurately, even with respect to our habitual exertions. Thus Dr. Porterfield, in his Treatise on the Eye, is at pains to prove, that the soul may think and will without knowledge or consciousness. But this, I own, is to me inconceivable. The true state of the fact, I apprehend, is, that the mind may think and will, without attending to its thoughts and volitions, so as to be able afterwards to recollect them.—Nor is this merely a verbal criticism; for there is an important difference between consciousness and attention, which it is very necessary to keep in view, in order to think upon this subject with any degree of precision.† The one is an involuntary state of the mind; the other is a voluntary act; the one has no immediate connexion with memory, but the other is so essentially subservient to it, that, without some degree of it, the ideas and perceptions which pass through the mind, seem to leave no trace behind them.

When two persons are speaking to us at once, we can attend to either of them at pleasure, without being much disturbed by the other. If we attempt to listen to both, we can understand neither.

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* See Note (E.)

† The distinctions between attention and consciousness is pointed out by Dr. Reid, in his Essays on the Intellectual Powers of Man, p. 60. "Attention is a voluntary act; it requires an active exertion to begin and to continue it; and it may be continued as long as we will; but Consciousness is involuntary, and of no continuance, changing with every thought." The same author has remarked, that these two operations of the mind have been frequently confounded by philosophers, and particularly by Mr. Locke.

The fact seems to be, that when we attend constantly to one of the speakers, the words spoken by the other make no impression on the memory, in consequence of our not attending to them; and affect us as little as if they had not been uttered. This power, however, of the mind to attend to either speaker at pleasure, supposes that it is, at one and the same time, conscious of the sensations which both produce.

Another well-known fact may be of use in illustrating the same distinction. A person who accidentally loses his sight, never fails to improve gradually in the sensibility of his touch.—Now, there are only two ways of explaining this. The one is, that, in consequence of the loss of the one sense, some change takes place in the physical constitution of the body, so as to improve a different organ of perception. The other, that the mind gradually acquires a power of attending to and remembering those slighter sensations of which it was formerly conscious, but which, from our habits of inattention, made no impression whatever on the memory. No one, surely, can hesitate for a moment, in pronouncing which of these two suppositions is the more philosophical.

Having treated, at considerable length, of those habits in which both mind and body are concerned, I proceed to make a few remarks on some phenomena which are purely intellectual; and which, I think, are explicable on the same principles with those which have been now under our review.

Every person who has studied the elements of geometry, must have observed many cases, in which the truth of a theorem struck him the moment he heard the enunciation. I do not allude to those theorems the truth of which is obvious almost to sense, such as, that any two sides of a triangle are greater than the third side, or that one circle cannot cut another circle in more than two points; but to *some propositions* with respect to quantity, considered abstractly, (to *some*, for example, in the fifth book of Euclid) which almost every student would be ready to admit without a demonstration. These propositions, however, do by no means belong to the class of axioms; for their evidence does not strike every person equally, but requires a certain degree of quickness to perceive it. At the same time, it frequently happens, that, although we are convinced the proposition is true, we cannot state immediately to others upon what our conviction is founded. In such cases, I think it highly probable, that before we give our assent to the theorem, a process of thought* has passed through the mind, but has passed through it so quickly, that we cannot without difficulty arrest our ideas in their rapid succession, and state them to others in their proper and logical order. It is some confirmation of this theory, that there are no propositions, of which it is more difficult to give a legitimate proof from first principles, than of those which are only removed a few steps from the class of axioms—and that those men who are the most remarkable for their quick perception of mathematical truth, are seldom clear and methodical in communicating their knowledge to others.—A man of a moderate degree of quickness, the very first time he is made acquainted with the fundamental principles of the method of fluxions, or of the method of prime and ultimate ratios, is almost instantaneously satisfied of their truth; yet how difficult is it to demonstrate these principles rigorously!

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* Of the nature of these processes of thought, I shall treat fully in another part of my work, under the article of Reasoning. I have expressed myself concerning them, in this chapter, in as general terms as possible.

What I have now said with respect to mathematics, may be applied in a great measure to the other branches of knowledge. How many questions daily occur to us, in morals, in politics, and in common life, in considering which, we almost instantaneously see where the truth lies, although we are not in a condition, all at once, to explain the grounds of our conviction! Indeed I apprehend, there are few, even among those who have devoted themselves to study, but who have not been habituated to communicate their knowledge to others, who are able to exhibit in their natural order, the different steps of any investigation by which they have been led to form a particular conclusion. The common observation, therefore, that an obscure elocution always indicates an imperfect knowledge of the subject, although it may perhaps be true with respect to men who have cultivated the art of speaking, is by no means to be relied on as a general rule, in judging of the talents of those, whose speculations have been carried on with a view merely to their own private satisfaction.

In the course of my own experience, I have heard of more than one instance of men, who, without any mathematical education, were able, on a little reflection, to give a solution of any simple algebraical problem; and who, at the same time, were perfectly incapable of explaining by what steps they obtained the result. In these cases, we have a direct proof of the possibility of investigating even truths which are pretty remote, by an intellectual process, which, as soon as it is finished, vanishes almost entirely from the memory. —It is probable, that something of the same kind takes place much more frequently in the other branches of knowledge, in which our reasonings consist commonly but of a few steps. Indeed, I am inclined to think, that it is in this way that by far the greater part of our speculative conclusions are formed.

There is no talent, I apprehend, so essential to a public speaker, as to be able to state clearly every different step of those trains of thought by which he himself was led to the conclusions he wishes to establish. Much may be here done by study and experience. Even in those cases in which the truth of a proposition seems to strike us instantaneously, although we may not be able, at first, to discover the media of proof, we seldom fail in the discovery by perseverance.—Nothing contributes so much to form this talent as the study of metaphysics; not the absurd metaphysics of the schools, but that study which has the operations of the mind for its object.

By habituating us to reflect on the subjects of our consciousness, it enables us to retard, in a considerable degree, the current of thought; to arrest many of those ideas, which would otherwise escape our notice; and to render the arguments which we employ for the conviction of others, an exact transcript of those trains of inquiry and reasoning, which originally led us to form our opinions.

These observations lead me to take notice of an important distinction between the intellectual habits of men of speculation and of action. The latter, who are under a necessity of thinking and deciding on the spur of the occasion, are led to cultivate, as much as possible, a quickness in their mental operations, and sometimes acquire it in so great a degree, that their judgments seem to be almost intuitive. To those, on the other hand, who have not merely to form opinions for themselves, but to communicate them to others, it is necessary to retard the train of thought as it passes in the mind, so as to be able afterwards to recollect every different step of the process; a habit, which, in some cases, has such an influence on the intellectual powers, that there are men, who, even in their private speculations, not only make use of words as an instrument of thought, but form these words into regular sentences.

It may perhaps appear, at first, a paradoxical observation, that one great employment of philosophers, in a refined age, is to bring to light, and arrange, those rapid and confused trains of thought, which appear from the structure of languages, and from the monuments of ancient laws and governments, to have passed through the minds of men in the most remote and unenlightened periods. In proof, however, of this, it is sufficient to mention the systematical analogy which we find, to a certain degree, running through the structure of the most imperfect tongues, (for example, in the formation of the different parts of the verbs,) and those general principles, which the philosophical lawyer traces amidst an apparent chaos of precedents and statutes. In the language, too, of the rudest tribe, we find words transferred from one subject to another, which indicate, in the mind of the individual who first made the transference, some perception of resemblance or of analogy. Such transferences can hardly be ascribed to accident, but may be considered as proofs that the analogies, which the philosopher afterwards points out between the objects which are distinguished by the same name, had been perceived by the inventors of language, although it is more than probable that they never expressed them in words, nor could even have explained them if they had been questioned on the subject

Nor will this appear a bold or incredible supposition, if we reflect on the sagacity and ingenuity which savages, and even peasants, discover, in overcoming the difficulties which occur in their situation. They do not, indeed, engage in long processes of abstract reasoning, for which they have no inclination, and which it is impossible to carry on without the use of a cultivated and a copious language; but, when pressed by present circumstances, they combine means to accomplish particular ends, in a manner which indicates the exercise both of invention and of reasoning. It is probable that such processes are carried on in their minds with much less assistance from language, than a philosopher would derive on a similar occasion; and it is almost certain, that they would find themselves perfectly incapable of communicating to others the steps by which they were led to their conclusions. In consequence of these circumstances, the attainments of the human mind, in its ruder state, perish with the individual, without being recorded in writing, or perhaps expressed in words; and we are left to infer them indirectly from the structure of language, or from the monuments of ancient customs and institutions.

When a train of thought leads to any interesting conclusion, or excites any pleasant feeling, it becomes peculiarly difficult to arrest our fleeting ideas; because the mind, when once it has felt the pleasure, has little inclination to retrace the steps by which it arrived at it. This is one great cause of the difficulty attending philosophical criticism. When a critic explains to us, why we are pleased with any particular beauty, or offended with any defect, it is evident, that if his theory be just, the circumstances which he points out as the foundation of our pleasure or uneasiness, must have occurred to our minds before we were pleased with the beauty, or offended with the defect. In such cases, it sometimes happens, when a critic has been fortunate in his theory, that we recognise at first sight our old ideas, and, without any farther consideration, are ready to bear testimony to the truth, from our own consciousness. So very difficult, however, is it to attend to the ideas which excite such feelings, that it often appears to be doubtful, whether a theory be right or wrong; and that where there is every reason to believe that the pleasure is produced in all men in the same way, different critics adopt different theories with respect to its cause. It is long practice alone, joined to what is commonly called a metaphysical turn of mind, (by which I think is chiefly to be understood, a capacity of reflecting on the subjects of our consciousness,) that can render such efforts of attention easy. Exquisite sensibility, so far from being useful in this species of criticism, both gives a disrelish for the study, and disqualifies for pursuing it.

Before we leave the subject of attention, it is proper to take notice of a question which has been stated with respect to it; whether we have the power of attending to more than one thing at one and the same instant; or, in other words, whether we can attend at one and the same instant, to objects which we can attend to separately?* This question has, if I am not mistaken, been already decided by several philosophers in the negative; and I acknowledge, for my own part, that although their opinion has not only been called in question by others, but even treated with some degree of contempt as altogether hypothetical, it appears to me to be the most reasonable and philosophical that we can form on the subject.

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* I have added this explanation to obviate the question, What is meant by *one* object?

There is indeed a great variety of cases, in which the mind apparently exerts different acts of attention at once; but from the instances which have already been mentioned, of the astonishing rapidity of thought, it is obvious, that all this may be explained, without supposing these acts to be co-existent; and I may even venture to add, it may all be explained in the most satisfactory manner, without ascribing to our intellectual operations a greater degree of rapidity, than that with which we know from the fact that they are sometimes carried on. The effect of practice, in increasing this capacity of apparently attending to different things at once, renders this explanation of the phenomenon in question more probable than any other.

The case of the equilibrist and rope-dancer already mentioned, is particularly favourable to this explanation; as it affords direct evidence of the possibility of the mind's exerting different successive acts in an interval of time so short, as to produce the same sensible effect, as if they had been exerted at one and the same moment. In this case, indeed, the rapidity of thought is so remarkable, that if the different acts of the mind were not all necessarily accompanied with different movements of the eye, there can be no reason for doubting, that the philosophers, whose doctrine I am now controverting, would have asserted, that they are all mathematically co-existent.

Upon a question, however, of this sort, which does not admit of a perfectly direct appeal to the fact, I would by no means be understood to decide with confidence; and therefore I should wish the conclusions I am now to state, to be received as only conditionally established. They are necessary and obvious consequences of the general principle, "that the mind can only attend to one thing at "once;" but must stand or fall with the truth of that supposition.

It is commonly understood, I believe, that, in a concert of music, a good ear can attend to the different parts of the music separately, or can attend to them all at once, and feel the full effect of the harmony. If the doctrine, however, which I have endeavoured to establish, be admitted, it will follow, that, in the latter case, the mind is constantly varying its attention from one part of the music to the other, and that its operations are so rapid, as to give us no perception of an interval of time.

The same doctrine leads to some curious conclusions with respect to vision. Suppose the eye to be fixed in a particular position, and the picture of an object to be painted on the retina. Does the mind perceive the complete figure of the object at once, or is this perception the result of the various perceptions we have of the different points in the outline? With respect to this question, the principles already stated lead me to conclude, that the mind does at one and the same time perceive every point in the outline of the object, (provided the whole of it be painted on the retina at the same instant,) for perception, like consciousness, is an involuntary operation. As no two points, however, of the outline are in the same direction, every point, by itself, constitutes just as distinct an object of attention to the mind, as if it were separated by an interval of empty space from all the rest. If the doctrine therefore formerly stated be just, it is impossible for the mind to attend to more than one of these points at once; and as the perception of the figure of the object implies a knowledge of the relative situation of the different points with respect to each other, we must conclude, that the perception of figure by the eye, is the result of a number of different acts of attention. These acts of attention, however, are performed with such rapidity, that the effect, with respect to us, is the same as if the perception were instantaneous.

In farther confirmation of this reasoning, it may be remarked, that if the perception of visible figure were an immediate consequence of the picture on the retina, we should have, at the first glance, as distinct an idea of a figure of a thousand sides, as of a triangle or a square. The truth is, that when the figure is very simple, the process of the mind is so rapid, that the perception seems to be instantaneous; but when the sides are multiplied beyond a certain number, the interval of time necessary for these different acts of attention becomes perceptible.

It may perhaps be asked, what I mean by a *point* in the outline of a figure, and what it is that constitutes this point *one* object of attention? The answer, I apprehend, is, that this point is the *minimum visibile*. If the point be less, we cannot perceive it: if it be greater, it is not all seen in one direction.

If these observations be admitted, it will follow, that, without the faculty of memory, we could have had no perception of visible figure.

CHAPTER THIRD.

OF CONCEPTION.

By Conception, I mean that power of the mind, which enables it to form a notion of an absent object of perception, or of a sensation which it has formerly felt. I do not contend that this is exclusively the proper meaning of the word, but I think that the faculty which I have now defined deserves to be distinguished by an appropriate name.

Conception is often confounded with other powers. When a painter makes a picture of a friend, who is absent or dead, he is commonly said to paint from memory: and the expression is sufficiently correct for common conversation. But in an analysis of the mind, there is ground for a distinction. The power of conception enables him to make the features of his friend an object of thought, so as to copy the resemblance; the power of memory recognizes these features as a former object of perception. Every act of memory includes an idea of the past; conception implies no idea of time whatever.*

According to this view of the matter, the word *conception* corresponds to what was called by the schoolmen *simple apprehension;* with this difference only, that they included, under this name, our apprehension of general propositions, whereas I should wish to limit the application of the word *conception* to our sensations, and the objects of our perceptions. Dr. Reid, in his Inquiry, substitutes the word *conception* instead of the simple apprehension of the schools, and employs it in the same extensive signification. I think it may contribute to make our ideas more distinct, to restrict its meaning: —and for such a restriction, we have the authority of philosophers in a case perfectly analogous.—In ordinary language, we apply the same word *perception* to the knowledge which we have by our senses of external objects, and to our knowledge of speculative truth: and yet an author would be justly censured, who should treat of these two operations of the mind under the same article of perception. I apprehend there is as wide a difference between the conception of a truth, and the conception of an absent object of sense, as between the perception of a tree, and the perception of a mathematical theorem.—I have therefore taken the liberty to distinguish also the two former operations of the mind; and under the article of *conception* shall confine myself to that faculty, whose province it is to enable us to form a notion of our past sensations, or of the objects of sense that we have formerly perceived.

Conception is frequently used as synonymous with Imagination. Dr. Reid says, that "imagination, in its proper sense, signifies a "lively conception of objects of sight." "This is a talent" (he remarks) "of importance to poets and orators; and deserves a pro"per name, on account of its connexion with their arts." He adds, that "imagination is distinguished from conception, as a part from "a whole."

I shall not inquire, at present, into the proper English meaning of the words *conception* and *imagination*. In a study such as this, so far removed from the common purposes of speech, some latitude may perhaps be allowed in the use of words, provided only that we define accurately those we employ, and adhere to our own definitions.

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* Shakspeare calls this power "The mind's eye."
Hamlet.—"My father! Methinks I see my father.
Horatio.—"Where, my Lord?
Hamlet.—"In my mind's eye, Horatio."
Act. i. Scene 4.

The business of conception, according to the account I have given of it, is to present us with an exact transcript of what we have felt or perceived. But we have, moreover, a power of modifying our conceptions, by combining the parts of different ones together, so as to form new wholes of our own creation. I shall employ the word *imagination* to express this power: and, I apprehend, that this is the proper sense of the word; if imagination be the power which gives birth to the productions of the poet and the painter. This is not a simple faculty of the mind. It presupposes abstraction, to separate from each other qualities and circumstances which have been perceived in conjunction, and also judgment and taste to direct us in forming the combinations. If they are made wholly at random, they are proofs of insanity.*

The first remarkable fact which strikes us with respect to conception is, that we can conceive the objects of some senses much more easily than those of others. Thus we can conceive an absent visible object, such as a building that is familiar to us, much more easily than a particular sound, a particular taste, or a particular pain, which we have formerly felt. It is probable, however, that this power might be improved in the case of some of our senses. Few people, I believe, are able to form a very distinct conception of sounds, and yet it is certain, that, by practice, a person may acquire a power of amusing himself with reading written music. And in the case of poetical numbers, it is universally known, that a reader may enjoy the harmony of the verse, without articulating the words, even in a whisper. In such cases, I take for granted, that our pleasure arises from a very strong conception of the sounds which we have been accustomed to associate with particular written characters.

The peculiarity, in the case of visible objects, seems to arise from this; that when we think of a sound or of a taste, the object of our conception is one single detached sensation; whereas every visible object is complex, and the conception which we form of it as a whole, is aided by the association of ideas. To perceive the force of this observation, it is necessary to recollect what was formerly said on the subject of attention. As we cannot at one instant attend to every point of the picture of an object on the retina, so, I apprehend, we cannot at one instant form a conception of the whole of any visible object, but that our conception of the object as a whole, is the result of many conceptions. The association of ideas connects the different parts together, and presents them to the mind in their proper arrangement, and the various relations which these parts bear to one another in point of situation, contribute greatly to strengthen the associations. It is some confirmation of this theory, that it is more easy to remember a succession of sounds, than any particular sound which we have heard detached and unconnected.

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* In common discourse, we often use the phrase of *thinking upon an object*, to express what I here call, the *conception* of it.—In the following passage, Shakspeare uses the former of these phrases, and the words *imagination* and *apprehension* as synonymous with each other.

——Who can hold a fire in his hand,
By thinking on the frosty Caucasus?
Or cloy the hungry edge of appetite,
By bare imagination of a feast?
Or wallow naked in December's snow,
By thinking on fantastic summers heat?
Oh no! the apprehension of the good
Gives but the greater feeling to the worse.
K. Richard II. Act i. Scene 6.

The power of conceiving visible objects, like all other powers that depend on the association of ideas, may be wonderfully improved by habit. A person accustomed to drawing retains a much more perfect notion of a building or of a landscape which he has seen, than one who has never practised that art. A portrait painter traces the form of a human body from memory, with as little exertion of attention, as he employs in writing the letters which compose his name.

In the power of conceiving colours, too, there are striking differences among individuals: and, indeed, I am inclined to suspect, that, in the greater number of instances, the supposed defects of sight in this respect ought to be ascribed rather to a defect in the power of conception. One thing is certain, that we often see men who are perfectly sensible of the difference between two colours when they are presented to them, who cannot give names to these colours, with confidence, when they see them apart, and are perhaps apt to confound the one with the other. Such men, it should seem, feel the sensation of colour like other men, when the object is present, but are incapable (probably in consequence of some early habit of inattention) to conceive the sensation distinctly when the object is removed. Without this power of conception, it is evidently impossible for them, however lively their sensations may be, to give a name to any colour; for the application of the name supposes not only a capacity of receiving the sensation, but a power of comparing it with one formerly felt. At the same time, I would not be understood by these observations to deny, that there are cases, in which there is a natural defect of the organ in the perception of colour. In some cases, perhaps, the sensation is not felt at all, and in others, the faintness of the sensation may be one cause of those habits of inattention, from which the incapacity of conception has arisen.

A talent for lively description, at least in the case of sensible objects, depends chiefly on the degree in which the describer possesses the power of conception. We may remark, even in common conversation, a striking difference among individuals in this respect. One man, in attempting to convey a notion of any object he has seen seems to place it before him, and to paint from actual perception; another, although not deficient in a ready elocution, finds himself in such a situation confused and embarrassed among a number of particulars imperfectly apprehended, which crowd into his mind without any just order and connexion. Nor is it merely to the accuracy of our descriptions that this power is subservient: it contributes more than any thing else to render them striking and expressive to others, by guiding us to a selection of such circumstances as are most prominent and characteristical; in so much that I think it may reasonably be doubted, if a person would not write a happier description of an object from the conception than from the actual perception of it. It has been often remarked, that the perfection of description does not consist in a minute specification of circumstances, but in a judicious selection of them, and that the best rule for making the selection is, to attend to the particulars that make the deepest impression on our own minds. When the object is actually before us, it is extremely difficult to compare the impressions which different circumstances produce, and the very thought of writing a description would prevent the impressions which would otherwise take place. When we afterwards conceive the object, the representation of it we form to ourselves, however lively, is merely an outline; and is made up of those circumstances, which really struck us most at the moment, while others of less importance are obliterated. The impression, indeed, which a circumstance makes on the mind, will vary considerably with the degree of a person's taste; but I am inclined to think, that a man of lively conceptions, who paints from these, while his mind is yet warm from the original scene, can hardly fail to succeed in descriptive composition.

The facts and observations which I have now mentioned, are applicable to conception, as distinguished from imagination. The two powers, however, are very nearly allied, and are frequently so blended, that it is difficult to say, to which of the two some particular operations of the mind are to be referred. There are also many general facts which hold equally with respect to both. The observations which follow, if they are well founded, are of this number, and might have been introduced with equal propriety under either article. I mention them here, as I shall have occasion to refer to them in the course of the following work, in treating of some subjects, which will naturally occur to our examination, before we have another opportunity of considering this part of our constitution.

It is a common, I believe I may say an universal, doctrine among logicians, that conception (or imagination, which is often used as synonymous with it) is attended with no belief of the existence of its object. " Perception," says Dr. Reid, " is attended with a belief of " the present existence of its object; memory, with a belief of its " past existence; but imagination is attended with no belief at all; " and was therefore called by the schoolmen *apprehensio simplex*."

It is with great diffidence, that I presume to call in question a principle, which has been so generally received; yet there are several circumstances which lead me to doubt of it. If it were a specifical distinction between perception and imagination, that the former is always attended with belief, and the latter with none, then the more lively our imagination were of any object, and the more completely that object occupied the attention, the less would we be apt to believe its existence; for it is reasonable to think, that when any one of our powers is employed separately from the rest, and there is nothing to withdraw the attention from it, the laws which regulate its operation will be most obvious to our observation, and will be most completely discriminated from those which are characteristical of the other powers of the mind. So very different however is the fact, that it is matter of common remark, that when imagination is very lively, we are apt to ascribe to its objects a real existence, as in the case of dreaming or of madness; and we may add, in the case of those who, in spite of their own general belief of the absurdity of the vulgar stories of apparitions, dare not trust themselves alone with their own imaginations in the dark. That imagination is in these instances attended with belief, we have all the evidence that the nature of the thing admits of, for we feel and act in the same manner as we *should* do, if we believed that the objects of our attention were *real*; which is the only proof that metaphysicians produce, or can produce, of the belief which accompanies perception.

In these cases, the fact, that I wish to establish, is so striking, that it has never been called in question; but in most cases, the impression which the objects of imagination make on the mind is so momentary, and is so immediately corrected by the surrounding objects of perception, that it has not time to influence our conduct. Hence we are apt to conclude on a superficial view, that imagination is attended with no belief; and the conclusion is surely just in most cases, if, by belief, we mean a permanent conviction which influences our conduct. But if the word be used in the strict logical sense, I am inclined to think, after the most careful attention to what I experience in myself, that the exercise both of conception and imagination is always accompanied with a belief that their objects exist.[*] When a painter conceives the face and figure of an absent friend, in order to draw *his* picture, he believes for the moment that his friend is before *him*. The belief, indeed is only momentary; for it is extremely difficult in our waking hours, to keep up a steady and undivided at-

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[*] As the foregoing reasoning, though satisfactory to myself, has not appeared equally so to some of my friends, I should wish the reader to consider the remarks which I now offer, as amounting rather to a query, than to a decided opinion.

May I take the liberty of adding, that one of the arguments which I have stated, in opposition to the common doctrine concerning imagination, appears to me to be authorized, in some measure, by the following reasoning of Dr. Reid's on a different subject? In considering those sudden bursts of passion, which lead us to wreak our vengeance upon inanimate objects, he endeavours to shew, that we have, in such cases, a momentary belief that the object is alive. "I confess," says he, "it seems to be impossible, that there should be resentment against a thing, which, at that very moment, is considered as inanimate; and consequently incapable either of intending hurt, or of being punished.—There must, therefore, I conceive, be some momentary notion or conception, that the object of our resentment is capable of punishment."

In another passage, the same author remarks, that "men may be governed, in their practice, by a belief, which, in speculation, they reject."

"I knew a man," says he, "who was as much convinced as any man of the folly of the popular belief of apparitions in the dark: yet he could not sleep in a room alone, nor go alone into a room in the dark. Can it be said, that his fear did not imply a belief of danger? This is impossible. Yet his philosophy convinced him, that he was in no more danger in the dark when alone, than with company. Here an unreasonable belief, which tention to any object we conceive or imagine, and as soon as the conception or the imagination is over, the belief which attended it is at an end. We find that we can recall and dismiss the objects of these powers at pleasure; and therefore we learn to consider them as creations of the mind, which have no separate and independent existence.

The compatibility of such a speculative disbelief, as I have here supposed, of the existence of an object, with a contrary momentary belief, may perhaps be more readily admitted, if the following experiment be considered with attention.

Suppose a lighted candle to be so placed before a concave mirror, that the image of the flame may be seen between the mirror and the eye of the observer. In this case, a person who is acquainted with the principles of optics, or who has seen the experiment made before, has so strong a speculative conviction of the non-existence of the object in that place where he sees its image, that he would not hesitate to put his finger to the apparent flame, without any apprehension of injury.

Suppose, however, that in such a case it were possible for the observer to banish completely from his thoughts all the circumstances of the experiment, and to confine his attention wholly to his perception; would he not believe the image to be a reality? and would he not expect the same consequences from touching it, as from touching a real body in a state of inflammation? If these questions be answered in the affirmative, it will follow, that the effect of the perception, while it engages the attention completely to itself, is to produce belief; and that the speculative disbelief, according to which our conduct in ordinary cases is regulated, is the result of a recollection of the various circumstances with which the experiment is accompanied.

If, in such a case as I have now supposed, the appearance exhibited to us is of such a nature, as to threaten us with any immediate danger, the effect is the same as if we were to banish from our thoughts the circumstances of the experiment, and to limit our attention solely to what we perceive: for here the belief, which is the first effect of the perception, alarms our fears, and influences our conduct, before reflection has time to operate. In a very ingenious optical deception, which was lately exhibited in this city, the image of a flower was presented to the spectator, and when he was about to lay hold of it with his hand, a stroke was aimed at him by the

was merely a prejudice of the nursery, stuck so fast as to govern his conduct, in opposition to his speculative belief as a philosopher and a man of sense."

"There are a few persons who can look down from the battlement of a very high tower without fear; while their reason convinces them, that they are in no more danger than when standing upon the ground."

These facts are easily explicable, on the supposition, that whenever the objects of imagination engross the attention wholly (which they may do, in opposition to any speculative opinion with respect to their non existence,) they produce a temporary belief of their reality.—Indeed, in the last passage, Dr. Reid seems to admit this to be the case; for, to say that a man who has a dread of apparitions, believes himself to be in danger when left alone in the dark, is to say, in other words, that he believes (for the time) that the objects of his imagination are real.

image of a dagger. If a person who has seen this experiment is asked in his cooler moments, whether or not he believes the dagger which he saw to be real, he will readily answer in the negative; and yet the accurate statement of the fact undoubtedly is, that the first and the proper effect of the perception is belief, and that the disbelief he feels, is the effect of subsequent reflection.

The speculative disbelief which we feel with respect to the illusions of imagination, I conceive to be analogous to our speculative disbelief of the existence of the object exhibited to the eye in this optical deception; as our belief that the illusions of imagination are real, while that faculty occupies the mind exclusively, is analogous to the belief produced by the optical deception while the attention is limited to our perception, and is withdrawn from the circumstances in which the experiment is made.*

These observations lead me to take notice of a circumstance with respect to the belief accompanying perception, which it appears to me necessary to state, in order to render Dr. Reid's doctrine on that subject completely satisfactory. He has shewn, that certain sensations are, by a law of our nature, accompanied with an irresistible belief of the existence of certain qualities of external objects. But this law extends no farther than to the present existence of the quality; that is, to its existence while we feel the corresponding sensation. Whence is it then, that we ascribe to the quality, an existence independent of our perception? I apprehend we learn to do this by experience alone. We find that we cannot, as in the case of imagination, dismiss or recall the perception of an external object. If I open my eyes, I cannot prevent myself from seeing the prospect which is before me. I learn therefore to ascribe to the objects of my senses, not only an existence at the time I perceive them, but an independent and a permanent existence.

It is a strong confirmation of this doctrine, that in sleep, when (as I shall endeavour afterwards to shew) the influence of the will over the train of our thoughts is suspended, and when, of consequence, the time of their continuance in the mind is not regulated by us, we ascribe to the objects of imagination an independent and permanent existence, as we do when awake to the objects of perception. The same thing happens in those kinds of madness, in which a particular idea takes possession of the attention, and occupies it to the exclusion of every thing else. Indeed, madness seems in many cases to arise entirely from a suspension of the influence of the will over the succession of our thoughts; in consequence of which, the objects of imagination appear to have an existence independent of our volition, and are therefore, agreeably to the foregoing doctrine, mistaken for realities.

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* It may appear to some readers rather trifling to add, and yet to others the remark may not be altogether superfluous, that it is not my intention to insinuate by the foregoing illustrations, that the relation between perception and imagination has the most distant analogy to that between the perception of the object, and the perception of its optical image.

Numberless other illustrations of the same general fact occur to me; but the following is, I think, one of the most striking. I mention it, in preference to the rest, as it appears to me to connect the doctrine in question with some principles which are now universally admitted among philosophers.

The distinction between the original and the acquired perceptions of sight, is familiarly known to every one who has the slightest acquaintance with the elements of optics. That this sense, prior to experience, conveys to us the notion of extension in two dimensions only, and that it gives us no information concerning the distances at which objects are placed from the eye, are propositions which nobody, I presume, in the present state of science, will be disposed to controvert. In what manner we are enabled, by a comparison between the perceptions of sight and those of touch, to extend the province of the former sense to a variety of qualities, originally perceived by the latter sense only, optical writers have explained at great length; but it is not necessary for my present purpose to enter into any particular details with respect to their reasonings on the subject. It is sufficient for me to remark, that, according to the received doctrine, the original perceptions of sight become, in consequence of experience, signs of the tangible qualities of external objects, and of the distances at which they are placed from the organ; and that, although the knowledge we obtain, in this manner, of these qualities and distances, seems, from early and constant habits, to be an instantaneous perception; yet, in many cases, it implies an exercise of the judgment, being founded on a comparison of a variety of different circumstances.

From these principles, it is an obvious consequence, that the knowledge we obtain by the eye, of the tangible qualities of bodies, involves the exercise of conception, according to the definition of that power which has already been given. In ordinary discourse, indeed, we ascribe this knowledge, on account of the instantaneousness with which it is obtained, to the power of perception; but if the common doctrine on the subject be just, it is the result of a complex operation of the mind; comprehending, first, the perception of those qualities, which are the proper and original objects of sight; and, secondly, the conception of those tangible qualities, of which the original perceptions of sight are found from experience to be the signs. The notions therefore we form, by means of the eye, of the tangible qualities of bodies, and of the distances of these objects from the organ, are mere conceptions; strongly, and indeed indissolubly, associated, by early and constant habit, with the original perceptions of sight.

When we open our eyes on a magnificent prospect, the various distances at which all its different parts are placed from the eye, and the immense extent of the whole scene before us, seem to be perceived as immediately, and as instantaneously by the mind, as the coloured surface which is painted on the retina. The truth, however, unquestionably is, that this variety of distance, and this immensity of extent, are not objects of sense, but of conception; and the notions we form of them when our eyes are open, differ from those we should form of them with our eyes shut, only in this, that they are kept steadily in the view of the mind, by being strongly associated with the sensations of colour, and with the original perceptions of sight.—This observation will be the more readily admitted, if it be considered, that, by a skilful imitation of a natural landscape in a common shew-box, the mind may be led to form the same notions of variety of distance, and even of immense extent, as if the original scene were presented to our senses: and that, although, in this case, we have a speculative conviction that the sphere of our vision only extends to a few inches, yet so strong is the association between the original perceptions of sight, and the conceptions which they *habitually* produce, that it is not possible for us, by any effort of our will, to prevent these conceptions from taking place.

From these observations it appears, that when the conceptions of the mind are rendered steady and permanent, by being strongly associated with any sensible impression, they command our belief no less than our actual perceptions; and, therefore, if it were possible for us, with our eyes shut, to keep up, for a length of time, the conception of any sensible object, we should, as long as this effort continued, believe that the object was present to our senses.

It appears to me to be no slight confirmation of these remarks, that although, in the dark, the illusions of imagination are much more liable to be mistaken for realities, than when their momentary effects on the belief are continually checked and corrected by the objects which the light of day presents to our perception, yet, even total darkness is not so alarming to a person impressed with the vulgar stories of apparitions, as a faint and doubtful twilight, which affords to the conceptions an opportunity of fixing and prolonging their existence, by attaching themselves to something which is *obscurely* exhibited to the eye.—In like manner, when we look through a fog, we are frequently apt to mistake a crow for a man; and the conception we have, upon such an occasion, of the human figure, is much more distinct and much more steady, than it would be possible for us to form, if we had no sensible object before us; in so much that when, on a more attentive observation, the crow shrinks to its own dimensions, we find it impossible, by any effort, to conjure up the phantom which a moment before we seemed to perceive.

If these observations are admitted, the effects which exhibitions of fictitious distress produce on the mind, will appear less wonderful than they are supposed to be. During the representation of a tragedy, I acknowledge, that we have a general conviction that the whole is a fiction, but, I believe, it will be found, that the violent emotions which are sometimes produced by the distresses of the stage, take their rise, in most cases, from a momentary belief, that the distresses are real. I say, in most cases, because I acknowledge, that independently of any such belief, there is something contagious in a faithful expression of any of the passions.

The emotions produced by a tragedy are, upon this supposition, somewhat analogous to the dread we feel when we look down from the battlement of a tower.* In both cases, we have a general conviction, that there is no ground for the feelings we experience, but the momentary influences of imagination are so powerful as to produce these feelings, before reflection has time to come to our relief.

CHAPTER FOURTH.

OF ABSTRACTION.

SECTION I.

General observations on this Faculty of the Mind.

THE origin of appellatives, or, in other words, the origin of those classes of objects which, in the schools, are called *genera*, and *species*, has been considered by some philosophers as one of the most difficult problems in metaphysics. The account of it which is given by Mr. Smith, in his Dissertation on the Origin of Languages, appears to me to be equally simple and satisfactory.

"The assignation" (says he) "of particular names, to denote particular objects; that is, the institution of nouns substantive, would probably be one of the first steps towards the formation of Language. The particular cave, whose covering sheltered the savage from the weather; the particular tree, whose fruit relieved his hunger; the particular fountain, whose water allayed his thirst; would first be denominated by the words, cave, tree, fountain; or by whatever other appellations he might think proper, in that primitive jargon, to mark them. Afterwards, when the

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* With respect to the dread which we feel in looking down from the battlement of a tower, it is curious to remark the effects of habit in gradually destroying it. The manner in which habit operates in this case, seems to be by giving us a command over our thoughts, so as to enable us to withdraw our attention from the precipice before us, and direct it to any other object at pleasure. It is thus that the mason and the sailor not only can take precautions for their own safety, but remain completely masters of themselves in situations where other men, engrossed with their imaginary danger, would experience a total suspension of their faculties. Any strong passion, which occupies the mind, produces, for the moment, the same effect with habit. A person alarmed with the apprehension of fire, has been known to escape from the top of a house, by a path which, at another time, he would have considered as impracticable; and soldiers, in mounting a breach, are said to have sometimes found their way to the enemy, by a route which appeared inaccessible after their violent passions had subsided.

"more enlarged experience of this savage had led him to observe, "and his necessary occasions obliged him to make mention of, other "caves, and other trees, and other fountains; he would naturally "bestow upon each other of those new objects, the same name by "which he had been accustomed to express the similar object he "was first acquainted with. And thus, those words, which were "originally the proper names of individuals, would each of them insensibly become the common name of a multitude."*

"It is this application" (he continues) "of the name of an individual to a great number of objects, whose resemblance naturally "recalls the idea of that individual, and of the name which expresses it, that seems originally to have given occasion to the formation of those classes, and assortments, which, in the schools, are "called *genera*, and *species*; and of which the ingenious and eloquent Rousseau finds himself so much at a loss to account for the "origin. What constitutes a *species*, is merely a number of objects, "bearing a certain degree of resemblance to one another; and, on "that account, denominated by a single appellation, which may be "applied to express any one of them."†

This view of the natural progress of the mind, in forming classifications of external objects, receives some illustration from a fact mentioned by Captain Cook in his account of a small island called Wateeoo, which he visited in sailing from New Zealand to the Friendly Islands. "The inhabitants," says he, "were afraid to come "near our cows and horses, nor did they form the least conception "of their nature. But the sheep and goats did not surpass the limits of their ideas; for they gave us to understand that they knew "them to be birds. It will appear," he adds, "rather incredible, "that human ignorance could ever make so strange a mistake, there "not being the most distant similitude between a sheep or goat. "and any winged animal. But these people seemed to know nothing of the existence of any other land animals, besides hogs, dogs, "and birds. Our sheep and goats, they could see, were very different creatures from the two first, and therefore they inferred that "they must belong to the latter class, in which they knew that there "is a considerable variety of species."—I would add to Cook's very judicious remarks, that the mistake of these islanders probably did not arise from their considering a sheep or a goat as bearing a more striking resemblance to a bird, than to the two classes of quadrupeds with which they were acquainted; but to the want of a generic word, such as *quadruped* comprehending these two species; which men in their situation would no more be led to form, than a person who had only seen one individual of each species, would think of an appellative to express both, instead of applying a proper name to each. In consequence of the variety of birds, it appears, that they had a generic name comprehending all of them, to which it was not unnatural for them to refer any new animal they met with.

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* The same account of the progress of the mind in the formation of *genera*, is given by the Abbé de Condillac.

"Un enfant appelle du nom d'*Arbre* le premier arbre que nous lui montrons. Un second arbre qu'il voit ensuite lui rapelle la même idée; il lui donne le même nom; de même à un troisième, à un quatrième, et voilà le mot d'*Arbre* donné d'abord à un individu, qui devient pour lui un nom de classe ou de genre, une ideé abstraite qui comprend tous les arbres en général.

† Dissertation on the Origin of Languages, annexed to Mr. Smith's Theory of Moral Sentiments. Boston edition, vol. ii. p. 217, &c.

The classification of different objects supposes a power of attending to some of their qualities or attributes, without attending to the rest; for no two objects are to be found without some specific difference; and no assortment or arrangement can be formed among things not perfectly alike, but by losing sight of their distinguishing peculiarities, and limiting the attention to those attributes which belong to them in common. Indeed, without this power of attending separately to things which our senses present to us in a state of union, we never could have had any idea of *number;* for, before we can consider different objects as forming a multitude, it is necessary that we should be able to apply to all of them one common name; or, in other words, that we should reduce them all to the same genus. The various objects, for example, animate and inanimate, which are, at this moment, before me, I may class and number in a variety of different ways, according to the view of them that I choose to take. I may reckon successively the number of sheep, of cows, of horses, of elms, of oaks, of beeches; or I may first reckon the number of animals, and then the number of trees; or I may at once reckon the number of all the organized substances which my senses present to me. But whatever be the principle on which my classification proceeds, it is evident, that the objects numbered together, must be considered in those respects only in which they agree with each other; and that, if I had no power of separating the combinations of sense, I never could have conceived them as forming a plurality.

This power of considering certain qualities or attributes of an object apart from the rest; or, as I would rather choose to define it, the power which the understanding has, of separating the combinations which are presented to it, is distinguished by logicians by the name of *abstraction.* It has been supposed by some philosophers, (with what probability I shall not now inquire,) to form the characteristical attribute of a rational nature. That it is one of the most important of all our faculties, and very intimately connected with the exercise of our reasoning powers, is beyond dispute. And, I flatter myself, it will appear from the sequel of this chapter, how much the proper management of it conduces to the success of our philosophical pursuits, and of our general conduct in life.

The subserviency of Abstraction to the power of Reasoning, and also, its subserviency to the exertions of a Poetical or Creative Imagination, shall be afterwards fully illustrated. At present, it is sufficient for my purpose to remark, that as abstraction is the groundwork of classification, without this faculty of the mind we should have been perfectly incapable of general speculation, and all our knowledge must necessarily have been limited to individuals; and that some of the most useful branches of science, particularly the different branches of mathematics, in which the very subjects of our reasoning are abstractions of the understanding, could never have possibly had an existence. With respect to the subserviency of this faculty to poetical imagination, it is no less obvious, that, as the poet is supplied with all his materials by experience; and as his province is limited to combine and modify things which really exist, so as to produce new wholes of his own; so every exertion which he thus makes of his powers, presupposes the exercise of abstraction in decomposing and separating actual combinations. And it was on this account, that, in the chapter on Conception, I was led to make a distinction between that faculty, which is evidently simple and uncompounded, and the power of Imagination, which (at least in the sense in which I employ the word in these inquiries) is the result of a combination of various other powers.

I have introduced these remarks, in order to point out a difference between the abstractions which are subservient to reasoning, and those which are subservient to imagination. And, if I am not mistaken, it is a distinction which has not been sufficiently attended to by some writers of eminence. In every instance in which imagination is employed in forming new wholes, by decompounding and combining the perceptions of sense, it is evidently necessary that the poet or the painter should be able to state to himself the circumstances abstracted, as separate objects of conception. But this is by no means requisite in every case in which abstraction is subservient to the power of reasoning; for it frequently happens, that we can reason concerning one quality or property of an object abstracted from the rest, while, at the same time, we find it is impossible to conceive it separately. Thus, I can reason concerning extension and figure, without any reference to colour; although it may be doubted, if a person possessed of sight can make extension and figure steady objects of conception, without connecting with them one colour or another. Nor is this always owing (as it is in the instance now mentioned) merely to the association of ideas; for there are cases, in which we can reason concerning things separately, which it is impossible for us to suppose any being so constituted as to conceive apart. Thus, we can reason concerning length, abstracted from any other dimension; although, surely, no understanding can make length, without breadth, an object of conception. And by the way, this leads me to take notice of an errour, which mathematical teachers are apt to commit, in explaining the first principles of geometry. By dwelling long on Euclid's first definitions, they lead the student to suppose that they relate to notions which are extremely mysterious, and to strain his powers in fruitless attempts to conceive, what cannot possibly be made an object of conception. If these definitions were omitted, or very slightly touched upon, and the attention at once directed to geometrical reasonings, the student would immediately perceive, that although the lines in the diagrams are really extended in two dimensions, yet that the demonstrations relate only to one of them; and that the human understanding has the faculty of reasoning concerning things separately, which are always presented to us, both by our powers of perception and conception, in a state of union. Such abstractions, in truth, are familiar to the most illiterate of mankind; and it is in this very way that they are insensibly formed. When a tradesman speaks of the length of a room, in contradistinction to its breath; or when he speaks of the distance between any two objects, he forms exactly the same abstraction, which is referred to by Euclid in his second definition; and which most of his commentators have thought it necessary to illustrate by prolix metaphysical disquisitions.

I shall only observe farther, with respect to the nature and province of this faculty of the mind, that notwithstanding its essential subserviency to every act of classification, yet it might have been exercised, although we had only been acquainted with one individual object. Although, for example, we had never seen but one rose, we might still have been able to attend to its colour, without thinking of its other properties. This has led some philosophers to suppose, that another faculty besides abstraction, to which they have given the name of generalization, is necessary to account for the formation of genera and species; and they have endeavoured to shew, that although generalization without abstraction is impossible; yet that we might have been so formed, as to be able to abstract, without being capable of generalizing. The grounds of this opinion it is not necessary for me to examine, for any of the purposes which I have at present in view.

SECTION II.

Of the Objects of our Thoughts, when we employ general Terms.

From the account which was given in a former chapter, of the common theories of perception, it appears to have been a prevailing opinion among philosophers, that the qualities of external objects are perceived by means of images or species transmitted to the mind by the organs of sense: an opinion of which I already endeavoured to trace the origin, from certain natural prejudices suggested by the phenomena of the material world. The same train of thinking has led them to suppose that, in the case of all our other intellectual operations, there exist in the mind certain ideas distinct from the mind itself; and that these ideas are the objects about which our thoughts are employed. When I recollect, for example, the appearance of an absent friend, it is supposed that the immediate object of my thoughts is an *idea* of my friend; which I at first received by my senses, and which I have been enabled to retain in the mind by the faculty of memory. When I form to myself any imaginary combination by an effort of poetical invention, it is supposed, in like manner, that the parts which I combine, existed previously in the mind; and furnish the materials on which it is the province of imagination to operate. It is to Dr. Reid we owe the important remark, that all these notions are wholly hypothetical; that it is impossible to produce a shadow of evidence in support of them; and that, even although we were to admit their truth, they would not render the phenomena in question more intelligible. According to his principles, therefore, we have no ground for supposing, that, in any one operation of the mind, there exists in it an object distinct from the mind itself; and all the common expressions which involve such a supposition, are to be considered as unmeaning circumlocutions, which serve only to disguise from us the real history of the intellectual phenomena.*

"We are at a loss to know," (says this excellent philosopher,) "how we perceive distant objects; how we remember things past; how we imagine things that have no existence. Ideas in the mind seem to account for all these operations; they are all by the means of ideas reduced to one operation; to a kind of feeling, or immediate perception of things present, and in contact with the percipient; and feeling is an operation so familiar, that we think

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* In order to prevent misapprehensions of Dr. Reid's meaning, in his reasonings against the ideal theory, it may be necessary to explain, a little more fully than I have done in the text, in what sense he calls in question the existence of *ideas*; for the meaning which this word is employed to convey in popular discourse, differs widely from that which is annexed to it by the philosophers whose opinion he controverts. This explanation I shall give in his own words.

"In popular language, idea signifies the same thing as conception, apprehension, notion. To have an idea of any thing, is to conceive it. To have a distinct idea, is to conceive it distinctly. To have no idea of it, is not to conceive it at all.—When the word idea is taken in this popular sense, no man can possibly doubt whether he has ideas."

"According to the philosophical meaning of the word *idea*, it does not signify that act of the mind which we call thought, or conception, but some *object* of thought. Of these objects of thought, called ideas, different sects of philosophers have given very different accounts."

"Some have held them to be self-existent; others to be in the divine mind; others in our own minds; and others in the brain, or sensorium." p. 213.

"The Peripatetic system of species and phantasms, as well as the Platonic system of ideas, is grounded upon this principle, that in every kind of thought, there must be some object that really exists; in every operation of the mind something to work upon. Whether this immediate object be called an idea with Plato, or a phantasm or species with Aristotle; whether it be eternal and uncreated, or produced by the impressions of external objects, is of no consequence in the present argument." Ibid. p. 338.

"So much is this opinion fixed in the minds of philosophers, that, I doubt not but it will appear to most a very strange paradox, or rather a contradiction, that men should think without ideas. But this appearance of contradiction arises from the ambiguity of the word, idea. If the idea of a thing means only the thought of it, which is the most common meaning of the word, to think without ideas, is to think without thought; which is undoubtedly a contradiction. But an idea, according to the definition given of it by philosophers, is not thought, but an object of thought, which really exists, and is perceived," &c. Ibid. p. 390.

I have only to add, that when, in this work, I make use of the word, idea, in stating my own opinions, I employ it uniformly in the popular sense, and not in the philosophical sense, as now explained; it would be better, perhaps, to avoid it altogether; but I have found it difficult to do so, without adopting unusual modes of expression. I flatter myself that I have used it with due caution.

"it needs no explanation, but may serve to explain other operations."

"But this feeling, or immediate perception, is as difficult to be "comprehended, as the things which we pretend to explain by it. "Two things may be in contact, without any feeling or perception; "there must therefore be in the percipient, a power to feel, or to "perceive. How this power is produced, and how it operates, is "quite beyond the reach of our knowledge. As little can we know, "whether this power must be limited to things present, and in contact with us. Neither can any man pretend to prove, that the "Being who gave us the power to perceive things present, may not "give us the power to perceive things distant, to remember things "past, and to conceive things that never existed."*

In another part of his work, Dr. Reid has occasion to trace the origin of the prejudice which has led philosophers to suppose, that, in all the operations of the understanding, there must be an object of thought, which really exists while we think of it. His remarks on this subject, which are highly ingenious and satisfactory, are contained in his account of the different theories concerning conception.†

As in all the ancient metaphysical systems it was taken for granted, (probably from the analogy of our external perceptions,) that every exertion of thought implies the existence of an object distinct from the thinking being; it naturally occurred, as a very curious question; What is the immediate object of our attention, when we are engaged in any general speculation? or, in other words, what is the nature of the idea corresponding to a general term? When I think of any particular object which I have formerly perceived, such as a particular friend, a particular tree, or a particular mountain, I can comprehend what is meant by a picture or representation of such objects; and therefore the explanation, given by the ideal theory, of that act of the mind which we formerly called Conception, if not perfectly satisfactory, is at least not wholly unintelligible. But what account shall we give, upon the principles of this theory, of the objects of my thoughts, when I employ the words, friend, tree, mountain, as generic terms? For, that all the things I have ever perceived are individuals, and consequently, that the ideas denoted by general words, (if such ideas exist,) are not copied from any originals that have fallen under my observation, is not only self-evident, but almost an identical proposition.

In answer to this question, the Platonists, and, at a still earlier period, the Pythagoreans, taught, that, although these universal ideas are not copied from any objects perceivable by sense, yet that they have an existence independent of the human mind, and are no more to be confounded with the understanding, of which they are the proper objects, than material things are to be confounded with our powers of external perception: that as all the individuals which compose a genus, must possess something in common; and as it is in consequence of this, that they belong to that genus, and are distinguishable by the same name, this common thing forms the essence of each, and is the object of the understanding, when we reason concerning the genus. They maintained also, that this common essence,[*] notwithstanding its inseparable union with a multitude of different individuals, is in itself, one and indivisible.

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* Essays on the Intellectual Powers, p. 214.

† Ibid. p. 378.

On most of these points, the philosophy of Aristotle seems to have coincided very nearly with that of Plato. The language, however, which these philosophers employed on this subject, was different, and gave to their doctrines the appearance of a wider diversity than probably existed between their opinions. While Plato was led, by his passion for the marvellous and the mysterious, to insist on the incomprehensible union of the same idea or essence with a number of individuals, without multiplication or division,[†] Aristotle, more cautious, and aiming at greater perspicuity, contented himself with saying, that all individuals are composed of matter and form, and that it is in consequence of possessing a common form, that different individuals belong to the same genus. But they both agreed, that, as the matter, or the individual natures of objects, were perceived by sense, so the general idea, or essence, or form, was perceived by the intellect; and that, as the attention of the vulgar was chiefly engrossed with the former, so the latter furnished to the philosopher the materials of his speculations.

The chief difference between the opinions of Plato and Aristotle on the subject of ideas, related to the mode of their existence. That the matter of which all things are made, existed from eternity, was a principle which both admitted; but Plato farther taught, that, of every species of things, there is an idea of form which also existed from eternity, and that this idea is the exemplar or model according to which the individuals of the species were made; whereas Aristotle held, that, although matter may exist without form, yet that forms could not exist without matter.[‡]

The doctrine of the Stoics concerning universals differed widely from those both of Plato and Aristotle, and seems to have approached to a speculation which is commonly supposed to be of a more recent origin, and which an eminent philosopher of the present age has ranked among the discoveries which do the greatest honour to modern genius.*

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[*] In this very imperfect sketch of the opinions of the ancients concerning universals, I have substituted, instead of the word *idea*, the word *essence*, as better fitted to convey to a modern reader the true import of Plato's expressions. The word *essentia* is said to have been first employed by Cicero; and it was afterwards adopted by the schoolmen, in the same sense in which the Platonists used the word *idea*. See Dr. Reid's Essays on the Intellectual Powers, page 473.

[†] "The idea of a thing," says Plato, "is that which makes *one* of the *many*; which, preserving the unity and integrity of its own nature, runs through and mixes with things infinite in number; and yet, however multiform it may appear, is always the same: so that by it we find out and discriminate the thing, whatever shapes it may assume, and under whatever disguise it may conceal itself."—Plato in Philebo, (quoted by the author of the Origin and Progress of Language, vol. i. p. 100, 2d edit.)

[‡] In this account of the difference between Plato and Aristotle on the subject of ideas, I have chiefly followed Brucker, whose very laborious researches with respect to this article of the history of philosophy are well known. In stating the distinction, however, I have confined myself to as general terms as possible; as the subject is involved in much

Whether this doctrine of the Stoics coincided entirely with that of the Nominalists, (whose opinions I shall afterwards endeavour to explain,) or whether it did not resemble more a doctrine maintained by another sect of schoolmen called Conceptualists, I shall not inquire. The determination of this question is interesting only to men of erudition, for the knowledge we possess of this part of the Stoical philosophy, is too imperfect to assist us in the farther prosecution of the argument, or even to diminish the merit of those philosophers who have, in modern times, been led to similar conclusions.†

As it is not my object, in this work to enter into historical details any farther than is necessary for illustrating the subjects of which I treat, I shall pass over the various attempts which were made by the Eclectic philosophers, (a sect which arose at Alexandria about the beginning of the third century,) to reconcile the doctrines of Plato and Aristotle concerning ideas. The endless difficulties it would appear, to which their speculations led, induced at last, the more cautious and modest inquirers to banish them entirely from Dialectics, and to content themselves with studying the arrangements or classifications of universals, which the ancient philosophers had made, without engaging in any metaphysical disquisitions concerning their nature. Porphyry, in particular, although he tells us, that he has speculated much on this subject, yet, in his introduction to Aristotle's Categories, waves the consideration of it as obscure and intricate. On such questions as these; "Whether genera and species "exist in nature, or are only conceptions of the Human Mind; and "(on the supposition that they exist in nature) whether they are in-"herent in the objects of sense, or disjoined from them?" he declines giving any determination.

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obscurity, and has divided the opinions of very eminent writers. The reader will find the result of Brucker's inquiries, in his own words, in Note (F.)

The authority of Brucker, in this instance, has the more weight with me, as it coincides in the most material respects with that of Dr. Reid. See his Essays on the Intellectual Powers of Man, and the conclusion of his Inquiry into the Human Mind.

A very different account of Aristotle's doctrine, in those particulars in which it is commonly supposed to differ from that of Plato, is given by two modern writers of great learning, whose opinions are justly entitled to much respect, from their familiar acquaintance with Aristotle's latter Commentators of the Alexandrian School.—See Origin and Progress of Language, vol. i. and HARRIS's Hermes.

It is of no consequence, for any of the purposes which I have at present in view, what opinion we form on this much controverted point of philosophical history. In so far as the ideal theory was an attempt to explain the manner in which our general speculations are carried on, it is agreed on all hands, that the doctrines of Plato and Aristotle were essentially the same; and accordingly, what I have said on that subject, coincides entirely with a passage which the reader will find in "Origin and Progress of Language," vol. i. p. 38, 2d edit.

* Treatise of Human Nature, book i. part i. sect. 7.

† See Note (G.)

This passage in Porphyry's Introduction is an object of curiosity, as, by a singular concurrence of circumstances, it served to perpetuate the memory of a controversy from which it was the author's intention to divert the inquiries of his readers. Amidst the disorders produced by the irruptions of the Barbarians, the knowledge of the Greek tongue was almost entirely lost; and the studies of Philosophers were confined to Latin versions of Aristotle's Dialectics, and of Porphyry's introduction concerning the Categories. With men who had a relish for such disquisitions, it is probable that the passage already quoted from Porphyry, would have a tendency rather to excite than to damp curiosity; and accordingly, we have reason to believe, that the controversy to which it relates continued, during the dark ages, to form a favourite subject of discussion. The opinion which was prevalent was, (to use the scholastic language of the times,) that universals do not exist *before* things, nor *after* things, but *in* things; that is, (if I may be allowed to attempt a commentary upon expressions to which I do not pretend to be able to annex very precise notions,) universal ideas have not (as Plato thought) an existence separable from individual objects, and, therefore, they could not have existed prior to them in the order of time; nor yet, (according to the doctrine of the Stoics,) are they mere conceptions of the mind, formed in consequence of an examination and comparison of particulars; but these ideas or forms are from eternity united inseparably with that matter of which things consist, or, as the Aristotelians sometimes express themselves, the forms of things are from eternity immersed in matter.—The reader, will, I hope, forgive me for entering into these details, not only on account of their connection with the observations which are to follow, but as they relate to a controversy which, for many ages, employed all the ingenuity and learning in Europe, and which, therefore, however frivolous in itself, deserves the attention of philosophers, as one of the most curious events which occurs in the history of the Human Mind.

Such appears to have been the prevailing opinion concerning the nature of universals, till the eleventh century, when a new doctrine, or (as some authors think) a doctrine borrowed from the school of Zeno, was proposed by Roscelinus;* and soon after very widely propagated over Europe, by the abilities and eloquence of one of his scholars, the celebrated Peter Abelard. According to these philosophers, there are no existences in nature corresponding to general terms, and the objects of our attention in all our general speculations are not ideas, but words.

In consequence of this new doctrine, the schoolmen gradually formed themselves into two sects; one of which attached itself to the opinions of Roscelinus and Abelard, while the other adhered to the principles of Aristotle. Of these sects, the former are known in literary history by the name of the Nominalists; the latter by that of the Realists.

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* See Note (H.)

As it is with the doctrine of the Nominalists that my own opinion on this subject coincides; and as I propose to deduce from it some consequences, which appear to me important, I shall endeavour to state it as clearly and precisely as I am able, pursuing, however, rather the train of my own thoughts, than guided by the reasonings of any particular author.

I formerly explained in what manner the words, which, in the infancy of language, were proper names, became gradually appellatives; in consequence of which extension of their signification, they would express, when applied to individuals, those qualities only which are common to the whole genus. Now, it is evident, that, with respect to individuals of the same genus, there are two classes of truths; the one, particular truths relating to each individual apart, and deduced from a consideration of its peculiar and distinguishing properties; the other, general truths, deduced from a consideration of their common qualities, and equally applicable to all of them. Such truths may be conveniently expressed, by means of general terms, so as to form propositions, comprehending under them as many particular truths, as there are individuals comprehended under the general terms. It is farther evident, that there are two ways in which such general truths may be obtained; either by fixing the attention on one individual, in such a manner that our reasoning may involve no circumstances but those which are common to the whole genus; or, (laying aside entirely the consideration of things,) by means of the general terms with which language supplies us. In either of these cases, our investigations must necessarily lead us to general conclusions. In the first case, our attention being limited to those circumstances, in which the subject of our reasoning resembles all other individuals of the same genus, whatever we demonstrate with respect to this subject must be true of every other to which the same attributes belong. In the second case, the subject of our reasoning being expressed by a generic word, which applies in common to a number of individuals, the conclusion we form must be as extensive in its application, as the name of the subject is in its meaning. The former process is analogous to the practice of geometers, who, in their most general reasonings, direct the attention to a particular diagram, the latter to that of algebraists, who carry on their investigations by means of symbols.* In cases of this last sort, it may frequently happen, from the association of ideas, that a general word may recall some one individual to which it is applicable, but this is so far from being necessary to the accuracy of our reasoning, that, excepting in some cases, in which it may be useful

* These two methods of obtaining general truths proceed on the same principles; and are in fact, much less different from each other, than they appear to be at first view. When we carry on a process of general reasoning, by fixing our attention on a particular individual of a genus, this individual is to be considered merely as a sign or representative, and differs from any other sign only in this, that it bears a certain resemblance to the things it denotes.—The straight lines which are employed in the fifth book of Euclid to represent magnitudes in general, differ from the algebraical expressions of these magnitudes, in the same respects in which picture-writing differs from arbitrary characters.

to check us in the abuse of general terms, it always has a tendency more or less, to mislead us from the truth. As the decision of a judge must necessarily be impartial when he is only acquainted with the relations in which the parties stand to each other, and when their names are supplied by letters of the alphabet, or by the fictitious names of Titius, Caius, and Sempronius; so in every process of reasoning, the conclusion we form is most likely to be logically just, when the attention is confined solely to signs, and when the imagination does not present to it those individual objects which may warp the judgment by casual associations.

To these remarks it may not be improper to add, that, although in our speculations concerning individuals, it is possible to carry on processes of reasoning, by fixing our attention on the objects themselves, without the use of language, yet it is also in our power to accomplish the same end, by substituting for these objects, words, or other arbitrary signs. The difference between the employment of language in such cases, and in our speculations concerning classes or genera, is, that in the former case the use of words is, in a great measure, optional, whereas, in the latter, it is essentially necessary. This observation deserves our attention the more, that, if I am not mistaken, it has contributed to mislead some of the Realists, by giving rise to an idea, that the use of language, in thinking about universals, however convenient, is not more necessary than in thinking about individuals.

According to this view of the process of the mind, in carrying on general speculations, that IDEA which the ancient philosophers considered as the essence of an individual, is nothing more than the particular quality or qualities in which it resembles other individuals of the same class, and in consequence of which, a generic name is applied to it. It is the possession of this quality, that entitles the individual to the generic appellation, and which, therefore may be said to be *essential* to its classification with that particular genus; but as all classifications are to a certain degree arbitrary, it does not necessarily follow, that it is more essential to its existence as an individual, than various other qualities which we are accustomed to regard as accidental. In other words, (if I may borrow the language of modern philosophy,) this quality forms its nominal, but not its real essence.

These observations will, I trust, be sufficient for the satisfaction of such of my readers as are at all conversant with philosophical inquiries. For the sake of others, to whom this disquisition may be new, I have added the following illustrations.

I shall have occasion to examine, in another part of my work, how far it is true, (as is commonly believed,) that every process of reasoning may be resolved into a series of syllogisms, and to point out some limitations, with which, I apprehend, it is necessary that this opinion should be received. As it would lead me, however, too far from my present subject, to anticipate any part of the doctrine which I am then to propose, I shall, in the following remarks, proceed on the supposition, that the syllogistic theory is well founded; a supposition which, although not strictly agreeable to truth, is yet sufficiently accurate for the use which I am now to make of it. Take then, any step of one of Euclid's demonstrations; for example, the first step of his first proposition, and state it in the form of a syllogism.—"All straight lines, drawn from the centre of a circle to "the circumference, are equal to one another." "But A B, and C "D, are straight lines, drawn from the centre of a circle to the cir"cumference. Therefore, A B is equal to C D."—It is perfectly manifest, that, in order to feel the force of this conclusion, it is by no means necessary, that I should annex any particular notions to the letters A B, or C D, or that I should comprehend what is meant by *equality*, or by a *circle*, its *centre*, and its *circumference*. Every person must be satisfied, that the truth of the conclusion is necessarily implied in that of the two premises; whatever the particular things may be to which these premises may relate. In the following syllogism, too:—"All men must die;—Peter is a man;—there"fore Peter must die;"—the evidence of the conclusion does not in the least depend on the particular notions I annex to the words *man*, and *Peter*; but would be equally complete, if we were to substitute instead of them, two letters of the alphabet, or any other insignificant characters.—"All X's must die;—Z is an X;—therefore Z "must die;"—is a syllogism which forces the assent no less than the former. It is farther obvious, that this syllogism would be equally conclusive, if, instead of the word *die*, I were to substitute any other verb that the language contains; and that, in order to perceive the justness of the inference, it is not even necessary that I should understand its meaning.

In general, it might be easily shewn, that all the rules of logic, with respect to syllogisms, might be demonstrated, without having recourse to any thing but letters of the alphabet; in the same manner, (and I may add, on the very same principles,) on which the algebraist demonstrates, by means of these letters, the various rules for transposing the terms of an equation.

From what has been said, it follows, that the assent we give to the conclusion of a syllogism does not result from any examination of the notions expressed by the different propositions of which it is composed, but is an immediate consequence of the relations in which the words stand to each other. The truth is, that, in every syllogism, the inference is only a particular instance of the general axiom, that whatever is true universally of any sign, must also be true of every individual which that sign can be employed to express. Admitting, therefore, that every process of reasoning may be resolved into a series of syllogisms, it follows, that this operation of the mind furnishes no proof of the existence of any thing corresponding to general terms, distinct from the individuals to which these terms are applicable.

These remarks, I am very sensible, do by no means exhaust the subject, for there are various modes of reasoning, to which the syllogistic theory does not apply. But, in all of them, without exception, it will be found, on examination, that the evidence of our conclusions appears immediately from the consideration of the words in which the premises are expressed, without any reference to the things which they denote. The imperfect account which is given of deductive evidence, in the received systems of logic, makes it impossible for me, in this place, to prosecute the subject any farther.

After all that I have said on the use of language as an instrument of reasoning, I can easily foresee a variety of objections which may occur to the doctrine I have been endeavouring to establish. But, without entering into a particular examination of these objections, I believe I may venture to affirm, that most, if not all, of them take their rise from confounding reasoning, or deduction, properly so called, with certain other intellectual processes, which it is necessary for us to employ in the investigation of truth. That it is frequently of essential importance to us, in our speculations, to withdraw our attention from words, and to direct it to the things they denote, I am very ready to acknowledge. All that I assert is, that, in so far as our speculations consist of that process of the mind which is properly called reasoning, they may be carried on by words alone; or, which comes to the same thing, that every process of reasoning is perfectly analogous to an algebraical operation. What I mean by "the other intellectual processes distinct from reasoning, which it is "necessary for us sometimes to employ in the investigation of truth," will, I hope, appear clearly from the following remarks.

In algebraical investigations, it is well known, that the practical application of a general expression, is frequently limited by the conditions which the hypothesis involves; and that, in consequence of a want of attention to this circumstance, some mathematicians of the first eminence have been led to adopt the most paradoxical and absurd conclusions. Without this cautious exercise of the judgment in the interpretation of the algebraical language, no dexterity in the use of the calculus will be sufficient to preserve us from errour. Even in algebra, therefore, there is an application of the intellectual powers perfectly distinct from any process of reasoning, and which is absolutely necessary for conducting us to the truth.

In geometry, we are not liable to adopt the same parodoxical conclusions, as in algebra, because the diagrams to which our attention is directed, serve as a continual check on our reasoning powers. These diagrams exhibit to our very senses, a variety of relations among the quantities under consideration, which the language of algebra is too general to express; in consequence of which, we are not conscious of any effort of the judgment distinct from a process of reasoning. As every geometrical investigation, however, may be expressed algebraically, it is manifest, that, in geometry, as well as in algebra, there is an exercise of the intellectual powers distinct from the logical process; although, in the former science, it is rendered so easy, by the use of diagrams, as to escape our attention.

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The same source of errour and of absurdity, which exists in algebra, is to be found, in a much greater degree, in the other branches of knowledge. Abstracting entirely from the ambiguity of language, and supposing also our reasonings to be logically accurate, it would still be necessary for us, from time to time, in all our speculations, to lay aside the use of words, and to have recourse to particular examples, or illustrations, in order to correct and to limit our general conclusions.—To a want of attention to this circumstance, a number of the speculative absurdities which are current in the world, might, I am persuaded, be easily traced.

Besides, however, this source of errour, which is in some degree common to all the sciences, there is a great variety of others, from which mathematics are entirely exempted, and which perpetually tend to lead us astray in our philosophical inquiries. Of these, the most important is that ambiguity in the signification of words, which renders it so difficult to avoid employing the same expressions in different senses, in the course of the same process of reasoning. This source of mistake, indeed, is apt, in a much greater degree, to affect our conclusions in metaphysics, morals, and politics, than in the different branches of natural philosophy, but, if we except mathematics, there is no science whatever, in which it has not a very sensible influence. In algebra, we may proceed with perfect safety through the longest investigations, without carrying our attention beyond the signs, till we arrive at the last result. But in the other sciences, excepting in those cases in which we have fixed the meaning of all our terms by accurate definitions, and have rendered the use of these terms perfectly familiar to us by very long habit, it is but seldom that we can proceed in this manner without danger of errour. In many cases, it is necessary for us to keep up, during the whole of our investigations, a scrupulous and constant attention to the signification of our expressions; and, in most cases, this caution in the use of words, is a much more difficult effort of the mind, than the logical process. But still this furnishes no exception to the general doctrine already delivered; for the attention we find it necessary to give to the import of our words, arises only from the accidental circumstance of their ambiguity, and has no essential connexion with that process of the mind, which is properly called reasoning, and which consists in the inference of a conclusion from premises. In all the sciences, this process of the mind is perfectly analogous to an algebraical operation; or, in other words, (when the meaning of our expressions is once fixed by definitions,) it may be carried on entirely by the use of signs, without attending, during the time of the process, to the things signified.

The conclusion to which the foregoing observations lead, appears to me to be decisive of the question, with respect to the objects of our thoughts when we employ general terms; for if it be granted, that words, even when employed without any reference to their particular signification, form an instrument of thought sufficient for all the purposes of reasoning, the only shadow of an argument in proof of the common doctrine on the subject, (I mean that which is founded on the impossibility of explaining this process of the mind on any other hypothesis,) falls to the ground. Nothing less, surely, than a conviction of this impossibility, could have so long reconciled philosophers to an hypothesis unsupported by any direct evidence, and acknowledged even by its warmest defenders, to involve much difficulty and mystery.

It does not fall within my plan, to enter, in this part of my work, into a particular consideration of the practical consequences which follow from the foregoing doctrine. I cannot, however, help remarking the importance of cultivating, on the one hand, a talent for ready and various illustration, and, on the other, a habit of reasoning by means of general terms. The former talent is necessary, not only for correcting and limiting our general conclusions, but for enabling us to apply our knowledge, when occasion requires, to its real practical use. The latter serves the double purpose, of preventing our attention from being distracted during the course of our reasonings, by ideas which are foreign to the point in question, and of diverting the attention from those conceptions of particular objects and particular events, which might disturb the judgment, by the ideas and feelings, which are apt to be associated with them in consequence of our own casual experience.

This last observation points out to us, also, one principal foundation of the art of the orator. As his object is not so much to inform and to satisfy the understandings of his hearers, as to force their immediate assent, it is frequently of use to him to clothe his reasonings in that specific and figurative language, which may either awaken in their minds associations favourable to his purpose, or may divert their attention from a logical examination of his argument. A process of reasoning so expressed, affords at once an exercise to the judgment, to the imagination, and to the passions, and is apt, even when loose and inconsequential, to impose on the best understandings.

It appears farther from the remarks which have been made, that the perfection of philosophical language, considered either as an instrument of thought, or as a medium of communication with others, consists in the use of expressions, which from their generality, have no tendency to awaken the powers of conception and imagination; or, in other words, it consists in its approaching, as nearly as possible, in its nature, to the language of algebra. And hence the effects which long habits of philosophical speculation have, in weakening, by disuse, those faculties of the mind, which are necessary for the exertions of the poet and the orator, and of gradually forming a style of composition, which they who read merely for amusement are apt to censure for a want of vivacity and of ornament.

SECTION III.

Remarks on the Opinions of some modern Philosophers on the subject of the foregoing Section.

After the death of Abelard, through whose abilities and eloquence the sect of Nominalists had enjoyed, for a few years, a very splendid triumph, the system of the Realists began to revive; and it was soon so completely re-established in the schools, as to prevail, with little or no opposition, till the fourteenth century. What the circumstances were, which led philosophers to abandon a doctrine, which seems so strongly to recommend itself by its simplicity, it is not very easy to conceive. Probably the heretical opinions, which had subjected both Abelard and Roscelinus to the censure of the church, might create a prejudice also against their philosophical principles; and probably too, the manner in which these principles were stated and defended, was not the clearest, nor the most satisfactory.* The principal cause, however, I am disposed to think, of the decline of the sect of Nominalists, was their want of some palpable example, by means of which they might illustrate their doctrine. It is by the use which algebraists make of the letters of the alphabet in carrying on their operations, that Leibnitz and Berkeley have been most successful in explaining the use of language as an instrument of thought; and, as in the twelfth century, the algebraical art was entirely unknown, Roscelinus and Abelard must have been reduced to the necessity of conveying their leading idea by general circumlocutions, and must have found considerable difficulty in stating it in a manner satisfactory to themselves: a consideration, which, if it accounts for the slow progress which this doctrine made in the world, places in the more striking light, the genius of those men, whose sagacity led them, under so great disadvantages, to approach to a conclusion so just and philosophical in itself, and so opposite to the prevailing opinions of their age.

In the fourteenth century, this sect seems to have been almost completely extinct; their doctrine being equally reprobated by the two great parties which then divided the schools, the followers of Duns Scotus and of Thomas Aquinas. These, although they differed in their manner of explaining the nature of universals, and opposed each other's opinions with much asperity, yet united in rejecting the doctrine of the Nominalists, not only as absurd, but as leading to the most dangerous consequences. At last, William Occam, a native of England, and a scholar of Duns Scotus, revived the ancient controversy, and with equal ability and success vindicated the long-abandoned philosophy of Roscelinus. From this time the dispute was carried on with great warmth, in the universities of France, of Germany, and of England; more particularly in the two former countries, where the sovereigns were led, by some political views, to interest themselves deeply in the contest, and even to employ the civil power in supporting their favourite opinions. The emperor Lewis of Bavaria, in return for the assistance which, in his disputes with the Pope[*] Occam had given to him by his writings, sided with the Nominalists. Lewis the Eleventh of France, on the other hand, attached himself to the Realists, and made their antagonists the objects of a cruel persecution.[†]

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* The great argument which the Nominalists employed against the existence of universals was: "Entia non sunt multiplicanda praeter necessitatem."

The protestant reformation, at length, involved men of learning in discussions of a more interesting nature; but even the zeal of theological controversy could hardly exceed that with which the Nominalists and Realists had for some time before maintained their respective doctrines. "Clamores primum ad ravim, (says an author who had himself been an eye-witness of these literary disputes) "hinc improbitas, sannæ, minæ, convitia, dum luctantur, et uterque "alterum tentat prosternere: consumtis verbis venitur ad pugnos, ad "veram luctam ex ficta et simulata. Quin etiam, quæ contingunt in "palæstra, illic non desunt, colaphi, alapæ, consputio, calces, morsus, "etiam quæ jam supra leges palæstræ, fustes, ferrum, saucii multi, "nonnunquam occisi."[‡] That this account is not exaggerated, we have the testimony of no less an author than Erasmus, who mentions it as a common occurrence: "Eos usque ad pallorem, usque "ad convitia, usque ad sputa, nonnunquam et usque ad pugnos invicem digladiari, alios ut Nominales, alios ut Reales, loqui."[§]

The dispute to which the foregoing observations relate, although for some time after the Reformation interrupted by theological disquisitions, has been since occasionally revived by different writers; and, singular as it may appear, it has not yet been brought to a conclusion in which all parties are agreed. The names, indeed, of Nominalists and Realists exist no longer; but the point in dispute between these two celebrated sects, coincides precisely with a question which has been agitated in our own times, and which has led to one of the most beautiful speculations of modern philosophy.

Of the advocates who have appeared for the doctrine of the Nominalists, since the revival of letters, the most distinguished are, Hobbes, Berkeley, and Hume. The first has, in various parts of his works, reprobated the hypothesis of the Realists; and has stated the opinions of their antagonists with that acuteness, simplicity, and precision, which distinguish all his writings.[*] The second, considering (and, in my opinion, justly) the doctrines of the ancients concerning universals, in support of which so much ingenuity had been employed by the Realists, as the great source of mystery and errour in the abstract sciences, was at pains to overthrow it completely, by some very ingenious and original speculations of his own. Mr. Hume's[†] view of the subject, as he himself acknowledges, does not differ materially from that of Berkeley; whom, by the way, he seems to have regarded as the author of an opinion, of which he was only an expositor and defender, and which, since the days of Roscelinus and Abelard, has been familiarly known in all the universities of Europe.[‡]

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[*] Occam, we are told, was accustomed to say to the emperour: "Tu me defendas gladio, et ego te defendam calamo." BRUCKER, vol. iii. p. 848.

[†] MOSHEIM's Ecclesiastical History.

[‡] LUDOVICUS VIVES.

[§] The Nominalists procured the death of John Huss, who was a Realist; and in their letter to Lewis King of France, do not pretend to deny that he fell a victim to the resentment of their sect. The Realists, on the other hand, obtained, in the year 1479, the condemnation of John de Wesalia, who was attached to the party of the Nominalists. These contending sects carried their fury so far as to charge each other with "the sin against the Holy Ghost." MOSHEIM's Ecclesiastical History.

Notwithstanding, however, the great merit of these writers, in defending and illustrating the system of the Nominalists, none of them seem to me to have been fully aware of the important consequences to which it leads. The Abbe de Condillac was, I believe, the first (if we except, perhaps Leibnitz) who perceived that, if this system be true, a talent for reasoning must consist, in a great measure, in a skilful use of language as an instrument of thought. The most valuable of his remarks on this subject are contained in a treatise *De l' Art de Penser*, which forms the fourth volume of his "Cours d'Etude."

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[*] "The universality of one name to many things, hath been the cause that men think the things themselves are universal; and so seriously contend, that besides Peter and John, and all the rest of the men that are, have been, or shall be, in the world, there is yet something else, that we call Man, viz. Man in general; deceiving themselves, by taking the universal, or general appellation, for the thing it signifieth: For if one should desire the painter to make him the picture of man, which is as much as to say, of a man in general; he meaneth no more, but that the painter should choose what man he pleaseth to draw, which must needs be some of them that are, or have been, or may be; none of which are universal. But when he would have him to draw the picture of the king, or any particular person, he limiteth the painter to that one person he chuseth. It is plain, therefore, that there is nothing universal but names; which are therefore called indefinite, because we limit them not ourselves, but leave them to be applied by the hearer: whereas a singular name is limited and restrained to one of the many things it signifieth; as when we say, this man, pointing to him, or giving him his proper name, or by some such other way." HOBBES's Tripos, chap. v. § 6.

[†] "A very material question has been started concerning abstract or general ideas: Whether they be general or particular in the mind's conception of them? A great philosopher has disputed the received opinion in this particular; and has asserted, that all general ideas are nothing but particular ones annexed to a certain term, which gives them a more extensive signification, and makes them recall, upon occasion, other individuals, which are similar to them. As I look upon this to be one of the greatest and most valuable discoveries that have been made of late years in the republic of letters, I shall here endeavour to confirm it by some arguments, which, I hope, will put it beyond all doubt and controversy." Treatise of Human Nature, book i. part i. § 7.

[‡] Leibnitz, too, has declared himself a partisan of this sect, in a dissertation "De Stilo Philosophico Marii Nizolii." This Nizolius published a book at Parma, in the year 1553, entitled, "De Veris Principiis et vera Ratione Philosophandi;" in which he opposed several of the doctrines of Aristotle, particularly his opinion concerning universals. An edition of this work, with a Preface and Notes, was published by Leibnitz at Frankfort, in the year 1670. The preface and Notes are to be found in the fourth volume of his works, by Dutens. (Geneva, 1768.) I have inserted a short extract from the former, in Note (I) at the end of the volume.

Dr. Campbell, too, in his Philosophy of Rhetoric, has founded, on the principles of Berkeley and Hume, a very curious and interesting speculation, of which I shall have occasion afterwards to take notice.

The explanation which the doctrines of these writers afford of the process of the mind in general reasoning, is so simple, and at the same time, in my apprehension so satisfactory, that, I own it is with some degree of surprise I have read the attempts which have lately been made to revive the system of the Realists. One of the ablest of these attempts is by Dr. Price; who, in his very valuable Treatise on Morals, has not only employed his ingenuity in support of some of the old tenets of the Platonic school, but has even gone so far as to follow Plato's example, in connecting this speculation about universals, with the sublime questions of natural theology. The observations which he has offered in support of these opinions, I have repeatedly perused with all the attention in my power; but without being able to enter into his views, or even to comprehend fully his meaning. Indeed, I must acknowledge, that it appears to me to afford no slight presumption against the principles on which he proceeds, when I observe, that an author, remarkable, on most occasions, for precision of ideas, and for perspicuity of style, never fails to lose himself in obscurity and mystery, when he enters on these disquisitions.

Dr. Price's reasonings in proof of the existence of universals, are the more curious, as he acquiesces in some of Dr. Reid's conclusions with respect to the ideal theory of perception. That there are in the mind images or resemblances of things external, he grants to be impossible; but still he seems to suppose, that, in every exertion of thought, there is *something* immediately present to the mind, which is the object of its attention. "When abstract truth is contemplated, "is not" (says he) "the very object itself present to the mind? "When millions of intellects contemplate the equality of every an-"gle of a semicircle to a right angle, have they not all the same ob-"ject in view? Is this object nothing? Or is it only an image, or "kind of shadow? These inquiries," he adds, "carry our thoughts "high."[*]

The difficulty which has appeared so puzzling to this ingenious writer, is, in truth, more apparent than real. In the case of Perception, Imagination, and Memory, it has been already fully shewn, that we have no reason to believe the existence of any thing in the mind distinct from the mind itself; and that, even upon the supposition that the fact were otherwise, our intellectual operations would be just as inexplicable as they are at present. Why then should we suppose, that, in our general speculations, there must exist in the mind some object of its thoughts, when it appears that there is no evidence of the existence of any such object, even when the mind is employed about individuals?

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[*] The whole passage is as follows: "The word *idea* is sometimes used to signify the immediate object of the mind in thinking, considered as something in the mind, which represents the real object, but is different from it. This sense of an idea is derived from the notion, that when we think of any external existence, there is something immediately present to the mind, which it contemplates distinct from the object itself, that being at a distance. But what is this? It is bad language to call it an image in the mind of the object. Shall we say then, that there is indeed no such thing? But would not this be the same as to say that, when the mind is employed in viewing and examining any object, which is either not present to it, or does not exist, it is employed in viewing and examining nothing, and therefore does not then think at all? When abstract truth is contemplated, is not the very object itself present to the mind? When millions of intellects contemplate the equality of every angle in a semicircle to a right angle, have they not all the same object in view? Is this object nothing? Or is it only an image or kind of shadow?—These inquiries carry our thoughts high."

Still, however, it may be urged, that, although, in such cases, there should be no object of thought in the mind, there must exist something or other to which its attention is directed. To this difficulty I have no answer to make, but by repeating the fact which I have already endeavoured to establish, that there are only two ways in which we can possibly speculate about classes of objects; the one, by means of a word or generic term; the other by means of one particular individual of the class which we consider as the representative of the rest; and that these two methods of carrying on our general speculations, are at bottom so much the same, as to authorize us to lay down as a principle, that, without the use of signs, all our thoughts must have related to individuals. When we reason therefore, concerning classes or genera, the objects of our attention are merely signs; or if, in any instance, the generic word should recall some individual, this circumstance is to be regarded only as the consequence of an accidental association, which has rather a tendency to disturb, than to assist us in our reasoning.

Whether it might not have been possible for the Deity to have so formed us, that we might have been capable of reasoning concerning classes of objects, without the use of signs, I shall not take upon me to determine. But this we may venture to affirm with confidence, that man is not such a being. And indeed, even if he were, it would not therefore necessarily follow, that there exists any thing in a genus, distinct from the individuals of which it is composed; for we know that the power which we have, of thinking of particular objects without the medium of signs, does not in the least depend on their existence or non-existence at the moment we think of them.

It would be in vain, however, for us, in inquiries of this nature, to indulge ourselves in speculating about possibilities. It is of more consequence to remark the advantages which we derive from our actual constitution; and which, in the present instance, appear to me to be important and admirable: in as much as it fits mankind for an easy interchange of their intellectual acquisitions, by imposing on them the necessity of employing, in their solitary speculations, the same instrument of thought, which forms the established medium of their communications with each other.

In the very slight sketch which I have given of the controversy between the Nominalists and the Realists about the existence of universals, I have taken no notice of an intermediate sect called Conceptualists; whose distinguishing tenet is said to have been, that the mind has a power of forming general conceptions.* From the indistinctness and inaccuracy of their language on the subject, it is not a very easy matter to ascertain precisely what was their opinion on the point in question, but, on the whole, I am inclined to think, that it amounted to the two following propositions: first, that we have no reason to believe the existence of any essences, or universal ideas, corresponding to general terms; and secondly, that the mind has the power of reasoning concerning *genera*, or classes of individuals, *without the mediation of language.* Indeed, I cannot think of any other hypothesis which it is possible to form on the subject, distinct from those of the two celebrated sects already mentioned. In denying the existence of universals, we know that the Conceptualists agreed with the Nominalists. In what, then, can we suppose that they differed from them, but about the necessity of language as an instrument of thought, in carrying on our general speculations?

With this sect of Conceptualists, Dr. Reid is disposed to rank Mr. Locke; and I agree with him so far as to think, that, if Locke had any decided opinion on the point in dispute, it did not differ materially from what I have endeavoured to express in the two general propositions which I have just now stated. The apparent inconsistencies which occur in that part of his Essay in which the question is discussed, have led subsequent authors to represent his sentiments in different lights; but as these inconsistencies plainly shew, that he was neither satisfied with the system of the Realists, nor with that of the Nominalists, they appear to me to demonstrate that he leaned to the intermediate hypothesis already mentioned, notwithstanding the inaccurate and paradoxical manner in which he has expressed it.†

May I take the liberty of adding, that Dr. Reid's own opinion seems to me also to coincide nearly with that of the Conceptualists; or, at least, to coincide with the two propositions which I have already supposed to contain a summary of their doctrine? The absurdity of the ancient opinion concerning universals, as maintained both by Plato and Aristotle, he has exposed by the clearest and most decisive arguments; not to mention, that by his own very original and important speculations concerning the ideal theory, he has completely destroyed that natural prejudice from which the whole system of universal ideas gradually took rise. If, even in the case of individuals, we have no reason to believe the existence of any object of thought in the mind, distinct from the mind itself, we are at once relieved from all the difficulties in which philosophers have involved themselves, by attempting to explain, in consistency with that ancient hypothesis, the process of the mind in its general speculations.

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* "Nominales, deserta paulo Abelardi hypothesi, universalia in notionibus atque conceptibus mentis ex rebus singularibus abstractione formatis consistere statuebant, unde Conceptuales dicti sunt." Brucker, vol. iii. p. 908. (Lips. 1766.)

"Nominalium tres erant familiae. Aliqui, ut Rocelinus, universalia, meras esse voces docuerunt. Alii iterum in solo intellectu posuerunt, atque meros animi conceptus esse autumarunt, quos conceptuales aliqui vocant, et a nominalibus distinguunt, quanquam alii etiam confundant. Alii fuerunt, qui universalia quaesiverunt, non tam in vocibus, quam in sermonibus integris, quod Joh. Sarisberiensis adscribit Pet. Abelardo; quo quid intelligat ille, mihi non satis liquet."

Morhof. Polyhistor. Tom. Sec. lib. i. cap. xiii. § 2.

I have taken no notice of the last class of Nominalists here mentioned; as I find myself unable to comprehend their doctrine.

† See Note (K.)

On the other hand, it is no less clear, from Dr. Reid's criticisms on Berkeley and Hume, that his opinion does not coincide with that of the Nominalists; and that the power which the mind possesses of reasoning concerning classes of objects, appears to him to imply some faculty of which no notice is taken in the systems of these philosophers.

The long experience I have had of the candour of this excellent author, encourages me to add, that, in stating his opinion on the subject of universals, he has not expressed himself in a manner so completely satisfactory to my mind, as on most other occasions. That language is not an essential instrument of thought in our general reasonings, he has no where positively asserted. At the same time, as he has not affirmed the contrary, and as he has declared himself dissatisfied with the doctrines of Berkeley and Hume, his readers are naturally led to conclude, that this is his real opinion on the subject. His silence on this point is the more to be regretted, as it is the only point about which there can be any reasonable controversy among those who allow his refutation of the ideal hypothesis to be satisfactory. In consequence of that refutation, the whole dispute between the Realists, and the Conceptualists falls at once to the ground; but the dispute between the Conceptualists and the Nominalists (which involves the great question concerning the use of signs in general speculation) remains on the same footing as before.

In order to justify his own expressions concerning universals, and in opposition to the language of Berkeley and Hume, Dr. Reid is at pains to illustrate a distinction between conception and imagination, which, he thinks, has not been sufficiently attended to by philosophers. "An universal," says he, "is not an object of any external "sense, and therefore cannot be imagined; but it may be distinctly "conceived. When Mr. Pope says, 'The proper study of mankind "'is man;' I conceive his meaning distinctly; although I neither "imagine a black or a white, a crooked or a straight man. I can "conceive a thing that is impossible; but I cannot distinctly imagine "a thing that is impossible. I can conceive a proposition or a demon-"stration, but I cannot imagine either. I can conceive understand-"ing and will, virtue and vice, and other attributes of the mind; but "I cannot imagine them. In like manner, I can distinctly con-"ceive universals; but I cannot imagine them."*

It appears from this passage, that, by conceiving universals, Dr. Reid means nothing more, than understanding the meaning of propositions involving general terms. But the observations he has made (admitting them in their full extent) do not in the least affect the question about the necessity of signs, to enable us to speculate about such propositions. The vague use which metaphysical writers have made of the word *conception*, (of which I had occasion to take notice in a former chapter,) has contributed in part to embarass this subject. That we cannot conceive universals in a way at all analogous to that in which we conceive an absent object of sense, is granted on both sides. Why then should we employ the same word *conception*, to express two operations of the mind which are essentially different? When we speak of conceiving or understanding a general proposition, we mean nothing more than that we have a conviction, (founded on our previous use of the words in which it is expressed,) that we have it in our power, at pleasure, to substitute, instead of the general terms, some one of the individuals comprehended under them. When we hear a proposition announced, of which the terms are not familiar to us, we naturally desire to have it exemplified, or illustrated, by means of some particular instance; and when we are once satisfied by such an application, that we have the interpretation of the proposition at all times in our power, we make no scruple to say, that we conceive or understand its meaning; although we should not extend our views beyond the words in which it is announced, or even although no particular exemplification of it should occur to us at the moment. It is in this sense only, that the terms of any general proposition can possibly be understood: and therefore Dr. Reid's argument does not, in the least, invalidate the doctrine of the Nominalists, that, without the use of language, (under which term I comprehend every species of signs,) we should never have been able to extend our speculations beyond individuals.

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* P. 482.

That, in many cases, we may safely employ in our reasonings general terms, the meaning of which we are not even able to interpret in this way, and consequently, which are to us wholly insignificant, I had occasion already to demonstrate, in a former part of this section.

SECTION IV.

Continuation of the same Subject.—Inferences with respect to the Use of Language as an Instrument of Thought, and the Errours in Reasoning to which it occasionally gives rise.

In the last Section, I mentioned Dr. Campbell, as an ingenious defender of the system of the Nominalists, and I alluded to a particular application which he has made of their doctrine. The reasonings which I had then in view are to be found in the seventh chapter of the second book of his Philosophy of Rhetoric; in which chapter he proposes to explain, how it happens, "that nonsense so "often escapes being detected, both by the writer and the reader." The title is somewhat ludicrous in a grave philosophical work, but the disquisition to which it is prefixed, contains many acute and profound remarks on the nature and power of signs, both as a medium of communication, and as an instrument of thought.

Dr. Campbell's speculations with respect to language as an instrument of thought, seem to have been suggested by the following passage in Mr. Hume's Treatise of Human Nature. "I believe, every one who examines the situation of his mind in reasoning, will agree with me, that we do not annex distinct and complete ideas to every term we make use of; and that in talking of Government, Church, Negociation, Conquest, we seldom spread out in our minds all the simple ideas of which these complex ones are composed. It is, however, observable, that, notwithstanding this imperfection, we may avoid talking nonsense on these subjects; and may perceive any repugnance among the ideas, as well as if we had a full comprehension of them. Thus if, instead of saying, that, in war, the weaker have always recourse to negociation, we should say, that they have always recourse to conquest; the custom which we have acquired, of attributing certain relations to ideas, still follows the words, and makes us immediately perceive the absurdity of that proposition."

In the remarks which Dr. Campbell has made on this passage, he has endeavoured to explain in what manner our habits of thinking and speaking gradually establish in the mind such relations among the words we employ, as enable us to carry on processes of reasoning by means of them, without attending in every instance to their particular signification. With most of his remarks on this subject I perfectly agree, but the illustrations he gives of them, are of too great extent to be introduced here, and I would not wish to run the risk of impairing their perspicuity, by attempting to abridge them. I must therefore refer such of my readers as wish to prosecute the speculation, to his very ingenious and philosophical treatise.

"In consequence of these circumstances," (says Dr. Campbell,) "it happens that, in matters which are perfectly familiar to us, we are able to reason by means of words, without examining, in every instance, their signification. Almost all the possible applications of the terms (in other words, all the acquired relations of the signs) have become customary to us. The consequence is, that an unusual application of any term is instantly detected; this detection breeds doubt, and this doubt occasions an immediate recourse to ideas. The recourse of the mind, when in any degree puzzled with the signs, to the knowledge it has of the things signified, is natural, and on such subjects perfectly easy. And of this recourse the discovery of the meaning, or of the unmeaningness of what is said, is the immediate effect. But in matters that are by no means familiar, or are treated in an uncommon manner, and in such as are of an abstruse and intricate nature, the case is widely different." The instances in which we are chiefly liable to be imposed on by words without meaning are, (according to Dr. Campbell,) the three following:

First, Where there is an exuberance of metaphor.

Secondly, When the terms most frequently occurring, denote things which are of a complicated nature, and to which the mind is not sufficiently familiarized. Such are the words, Government, Church, State, Constitution, Polity, Power, Commerce, Legislature, Jurisdiction, Proportion, Symmetry, Elegance.

Thirdly, When the terms employed are very abstract, and consequently, of very extensive signification.* For an illustration of these remarks, I must refer the reader to the ingenious work which I just now quoted.

To the observations of these eminent writers, I shall take the liberty of adding, that we are doubly liable to the mistakes they mention, when we make use of a language which is not perfectly familiar to us. Nothing, indeed, I apprehend, can shew more clearly the use we make of words in reasoning than this, that an observation which, when expressed in our own language, seems trite or frivolous, often acquires the appearance of depth and originality by being translated into another. For my own part, at least, I am conscious of having been frequently led, in this way, to form an exaggerated idea of the merits of ancient and of foreign authors; and it has happened to me more than once, that a sentence, which seemed at first to contain something highly ingenious and profound, when translated into words familiar to me, appeared obviously to be a trite or a nugatory proposition.

The effect produced by an artificial and inverted style in our own language, is similar to what we experience when we read a composition in a foreign one. The eye is too much dazzled to see distinctly. “Aliud styli genus,” (says Bacon) “totum in eo est, ut verba sint aculeata, sententiæ concisæ, oratio denique potius versa quam fusa, quo fit, ut omnia per hujusmodi artificium, magis ingeniosa videantur quam re vera sint. Tale invenitur in Seneca effusius, in Tacito et Plinio secundo moderatius.”

The deranged collocation of the words in Latin composition, aids powerfully the imposition we have now been considering, and renders that language an inconvenient medium of philosophical communication, as well as an inconvenient instrument of accurate thought. Indeed, in all languages in which this latitude in the arrangement of words is admitted, the associations among words must be looser, than where one invariable order is followed; and of consequence, on the principles of Hume and Campbell, the mistakes which are committed in reasonings, expressed in such languages, will not be so readily detected.

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* “The more general any word is in its signification, it is the more liable to be abused by an improper or unmeaning application. A very general term is applicable alike to a multitude of different individuals, a particular term is applicable but to a few. When the rightful applications of a word are extremely numerous, they cannot all be so strongly fixed by habit, but that, for greater security, we must perpetually recur in our minds from the sign to the notion we have of the things signified; and for the reason aforementioned, it is in such instances difficult precisely to ascertain this notion. Thus the latitude of a word, though different from its ambiguity, hath often a similar effect.—Philosophy of Rhetoric, vol. ii. p. 122.

The errours in reasoning, to which we are exposed in consequence of the use of words as an instrument of thought, will appear the less surprising, when we consider, that all the languages which have hitherto existed in the world, have derived their origin from popular use, and that their application to philosophical purposes, was altogether out of the view of those men who first employed them, Whether it might not be possible to invent a language, which would at once facilitate philosophical communication, and form a more convenient instrument of reasoning and of invention, than those we possess at present, is a question of very difficult discussion, and upon which I shall not presume to offer an opinion. The failure of Wilkins's very ingenious attempt towards a real character, and a philosophical language, is not perhaps decisive against such a project; for, not to mention some radical defects in his plan, the views of that very eminent philosopher do not seem to have extended much farther than to promote and extend the literary intercourse among different nations. Leibnitz, so far as I know, is the only author who has hitherto conceived the possibility of aiding the powers of invention and of reasoning, by the use of a more convenient instrument of thought; but he has no where explained his ideas on this very interesting subject. It is only from a conversation of his with Mr. Boyle and Mr. Oldenburgh, when he was in England in 1673, and from some imperfect hints in different parts of his works,[*] that we find it had engaged his attention. In the course of this conversation he observed, that Wilkins had mistaken the true end of a real character, which was not merely to enable different nations to correspond easily together, but to assist the reason, the invention, and the memory. In his writings, too, he somewhere speaks of an alphabet of human thoughts, which he had been employed in forming, and which, probably, (as Fontenelle has remarked) had some relation to his universal language.[†]

The new nomenclature which has been introduced into chemistry, seems to me to furnish a striking illustration of the effect of appropriated and well-defined expressions, in aiding the intellectual powers; and the period is probably not far distant, when similar innovations will be attempted in some of the other sciences.

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[*] See note (L.)

[†] "M. Leibnits avoit conçu le projet d'une langue philosophique et universelle. Wilkins Evêque de Chester, et Dalgarno y avoient travaillé; mais dès le tems qu'il étoit en Angleterre, il avoit dit à Messieurs Boyle et d'Oldenbourg qu'il ne croyoit pas que ces grands hommes eussent encore frappé au but. Ils pouvoient bien faire que des nations qui ne s'entendoient pas eussent aisément commerce, mais ils n'avoient pas attrapé les véritables caractères réels, qui étoient l'instrument le plus fin dont l'esprit humain se pût servir, et qui devoient extrèmement faciliter et le raisonnement, et la memoire, et l'invention des choses. Ils devoient ressembler, autant qu'il étoit possible, aux caractères d'algèbre, qui en effet sont très simples et très expressifs, qui n'ont jamais ni superfluité, ni équivoque, et dont toutes les variétés sont raisonnées. Il a parlé en quelque endroit, d'un alphabet des pensées humaines, qu'il méditoit. Selon toutes les apparences, cet alphabet avoit rapport à sa langue universelle."

Eloge de M. LEIBNITZ *par M. de* FONTENELLE.

SECTION V.

Of the Purposes to which the Powers of Abstraction and Generalization are subservient.

It has been already shewn, that, without the use of signs, all our knowledge must necessarily have been limited to individuals, and that we should have been perfectly incapable both of classification and general reasoning. Some authors have maintained, that without the power of generalization, (which I have endeavoured to shew, means nothing more than the capacity of employing general terms,) it would have been impossible for us to have carried on any species of reasoning whatever. But I cannot help thinking that this opinion is erroneous, or, at least, that it is very imperfectly stated. The truth is, it appears to me to be just in one sense of the word *reasoning*, but false in another; and I even suspect it is false in that sense of the word in which it is most commonly employed. Before, therefore, it is laid down as a general proposition, the meaning we are to annex to this very vague and ambiguous term, should be ascertained with precision.

It has been remarked by several writers, that the expectation which we feel of the continuance of the laws of nature, is not founded upon reasoning; and different theories have of late been proposed to account for its origin. Mr. Hume resolves it into the association of ideas. Dr. Reid, on the other hand, maintains, that it is an original principle of our constitution, which does not admit of any explanation, and which, therefore, is to be ranked among those general and ultimate facts, beyond which philosophy is unable to proceed.[*] Without this principle of expectation, it would be impossible for us to accommodate our conduct to the established course of nature; and, accordingly, we find that it is a principle coëval with our very existence; and, in some measure, common to man with the lower animals.

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[*] In inquiries of this nature, so far removed from the common course of literary pursuits, it always gives me pleasure to remark a coincidence of opinion among different philosophers; particularly among men of original genius, and who have been educated in different philosophical systems. The following passage, in which M. de Condorcet gives an account of some of the mataphysical opinions of the late Mr. Turgot, approaches very nearly to Dr. Reid's doctrines.

"La mémoire de nos sensations, et la faculté que nous avons de réfléchir sur ces sensations passées et de les combiner, sont le seul principe de nos connoissances. La supposition qu'il existe des loix constantes auxquelles tous les phénomènes observés sont assujetis de maniere à reparoître dans tous les temps, dans toutes les circonstances, tels qu'ils sont déterminés par ces loix, est le seul foudement de la certitude de ces connoissances.

"Nous avons la conscience d'avoir observé cette constance, et un sentiment involontaire nous force de croire qu'elle continuera de subsister. La probabilité qui en resulté, quelque grande qu'elle soit, n'est pas une certitude. Aucune relation nécessaire ne lie pour nous le passé à l'avenir, ni la constance de ce que j'ai vu à celle de ce que j'aurois continué d'observer si j'étois resté dans des circonstances semblables; mais l'impression qui me porte à regarder comme existant, comme réel ce qui m'a présente ce caractere de constance est irrésistible."—*Vie de* TURGOT, partie ii. p. 56.

"Quand un François et un Anglois pensent de même, (says Voltaire,) il faut bien qu'ils aient raison."

It is an obvious consequence of this doctrine, that, although philosophers be accustomed to state what are commonly called the laws of nature, in the form of general propositions, it is by no means necessary for the practical purposes of life, that we should express them in this manner; or even that we should express them in words at all. The philosopher, for example, may state it as a law of nature, that "fire scorches;" or that "heavy bodies when unsupported fall downwards:" but, long before the use of artificial signs and even before the dawn of reason, a child learns to act upon both of these suppositions. In doing so, it is influenced merely by the instinctive principle which has now been mentioned, directed in its operation (as is the case with many other instincts) by the experience of the individual. If man, therefore, had been destined for no other purposes, than to acquire such an acquaintance with the course of nature as is necessary for the preservation of his animal existence, he might have fulfilled all the ends of his being without the use of language.

As we are enabled, by our instinctive anticipation of physical events, to accommodate our conduct to what we foresee is to happen, so we are enabled in many cases, to increase our power, by employing physical causes as instruments for the accomplishment of our purposes; nay, we can employ a series of such causes, so as to accomplish very remote effects. We can employ the agency of air, to increase the heat of a furnace; the furnace, to render iron malleable; and the iron to all the various purposes of the mechanical arts. Now, it appears to me, that all this may be conceived and done without the aid of language: and yet, assuredly, to discover a series of means subservient to a particular end, or, in other words, an effort of mechanical invention, implies, according to the common doctrines of philosophers, the exercise of our reasoning powers. In this sense, therefore, of the word reasoning, I am inclined to think, that it is not essentially connected with the faculty of generalization, or with the use of signs.

It is some confirmation of this conclusion, that savages, whose minds are almost wholly occupied with particulars, and who have neither inclination nor capacity for general speculations, are yet occasionally observed to employ a long train of means for accomplishing a particular purpose. Even something of this kind, but in a very inferiour degree, may, I think, be remarked in the other animals; and that they do not carry it farther, is probably not the effect of their want of generalization, but of the imperfection of some of those faculties which are common to them with our species, particularly of their powers of attention and recollection. The instances which are commonly produced to prove that they are not destitute of the power of reasoning, are all examples of that species of contrivance which has been mentioned; and are perfectly distinct from those intellectual processes to which the use of signs is essentially subservient.*

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* One of the best attested instances which I have met with, of sagacity in the lower

Whether that particular species of mechanical contrivance which has now been mentioned, and which consists merely in employing a series of physical causes to accomplish an effect which we cannot produce immediately, should or should not be dignified with the name of reasoning, I shall not now inquire. It is sufficient for my present purpose to remark, that it is essentially different from those intellectual processes to which the use of signs is indispensably necessary. At the same time, I am ready to acknowledge, that what I have now said, is not strictly applicable to those more complicated mechanical inventions, in which a variety of powers are made to conspire at once to produce a particular effect. Such contrivances, perhaps, may be found to involve processes of the mind which cannot be carried on without signs. But these questions will fall more properly under our consideration when we enter on the subject of reasoning.

In general, it may be remarked, that, in so far as our thoughts relate merely to individual objects, or to individual events, which we have actually perceived, and of which we retain a distinct remembrance,† we are not under the necessity of employing words. It

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animals, is mentioned by M. Bailly, in his *Lettre sur les Animaux*, addressed to M. Le Roy.

"Un de mes amis, homme d'esprit et digne de confiance, m'a raconté deux faits dont il a été témoin. Il avoit un singe très intelligent; il s'amusoit à lui donner des noix dont l'animal étoit très friand; mais il les plaçoit assez loin, pour que retenu par sa chaîne, le singe ne pût pas les atteindre: après bien des efforts inutiles qui ne servent qu' à préparer l'invention, le singe, voyant, passer un domestique portant une serviette sous le bras, se saisit de cette serviette, et s'en servit pour atteindre à la noix et l'amener jusqu' à lui. La manèire de casser la noix exigea une nouvelle invention; il en vint àbout, en plaçant la noix à terre, en y faisant tomber de haut une pierre ou un caillou pour la briser. Vous voyez, Monsieur, que sans avoir connu, comme Gallilée, les loix de la chûte des corps, le singe avoit bien remarque la force que ces corps acquierent par la chûte. Ce moyen cependant se trouva en défaut. Un jour qu'il avoit plu, la terre étoit molle, la noix enfonçoit, et la pierre n'avoit plus d'action pour la briser. Que fit le singe? Il alla chercher un tuileau, plaça la noix dessus, et en laissant tomber la pierre il brisa la noix qui n'enfonçoit plus."—*Discours et memoires par l' Auteur de l' Histoire de l' Astronomie. A Paris, 1790*, tome ii. p. 126.

Admitting these facts to be accurately stated, they still leave an essential distinction between man and brute; for in none of the contrivances here mentioned, is there any thing analogous to those intellectual processes which lead the mind to general conclusions, and which (according to the foregoing doctrine) imply the use of general terms. Those powers, therefore, which enable us to classify objects, and to employ signs as an instrument of thought, are, as far as we can judge, peculiar to the human species.

† I have thought it proper to add this limitation of the general proposition; because individual objects, and individual events, which have not fallen under the examination of our senses, cannot possibly be made the subjects of our consideration, but by means of language. The manner in which we think of such objects and events, is accurately described in the following passage of Wollaston; however unphilosophical the conclusion may be which he deduces from his reasoning.

"A man is not known ever the more to posterity, because his name is transmitted to them; he doth not live, because his name does. When it is said, Julius Cæsar subdued Gaul, beat Pompey, changed the Roman commonwealth into a monarchy, &c. it is the same thing as to say, the conqueror of Pompey was Cæsar; that is, Cæsar, and the conqueror of Pompey are the same thing; and Cæsar is as much known by the one distinction as the other.—The amount then is only this: that the conqueror of Pompey conquered Pompey; or somebody conquered Pompey; or rather, since Pompey is as little known now as Cæsar, somebody conquered somebody. Such a poor business is this boasted immortality; and such, as has been here described, is the thing called glory among us!" *Religion of* NAT. DEL. p. 117.

frequently, however, happens, that when the subjects of our consideration are particular, our reasoning with respect to them may involve very general notions; and, in such cases, although we may conceive, without the use of words, the things about which we reason, yet we must necessarily have recourse to language in carrying on our speculations concerning them. If the *subjects* of our reasoning be general (under which description I include all our reasonings, whether more or less comprehensive, which do not relate merely to individuals,) words are the sole objects about which our thoughts are employed. According as these words are comprehensive or limited in their signification, the conclusions we form will be more or less general; but this accidental circumstance does not in the least affect the nature of the intellectual process; so that it may be laid down as a proposition which holds without any exception, that, in every case, in which we extend our speculations beyond individuals, language is not only an useful auxiliary, but is the sole instrument by which they are carried on.

These remarks naturally lead me to take notice of what forms the characteristical distinction between the speculations of the philosopher and of the vulgar. It is not, that the former is accustomed to carry on his processes of reasoning to a greater extent than the latter; but that the conclusions he is accustomed to form, are far more comprehensive, in consequence of the habitual employment of more comprehensive terms. Among the most unenlightened of mankind, we often meet with individuals who possess the reasoning faculty in a very eminent degree, but as this faculty is employed merely about particulars, it never can conduct them to general truths, and, of consequence, whether their pursuits in life lead them to speculation or to action, it can only fit them for distinguishing themselves in some very limited and subordinate sphere. The philosopher, whose mind has been familiarized by education, and by his own reflections, to the correct use of more comprehensive terms, is enabled, without perhaps a greater degree of intellectual exertion than is necessary for managing the details of ordinary business, to arrive at general theorems; which, when illustrated to the lower classes of men, in their particular applications, seem to indicate a fertility of invention, little short of supernatural.*

The analogy of the algebraical art may be of use in illustrating these observations. The difference, in fact, between the investigations we carry on by its assistance, and other processes of reasoning, is more inconsiderable than is commonly imagined; and, if I am not mistaken, amounts only to this, that the former are expressed in an appropriate language, with which we are not accustomed to associate particular notions. Hence they exhibit the efficacy of signs as an instrument of thought in a more distinct and palpable manner, than the speculations we carry on by words, which are continually awakening the power of Conception.

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* "General reasonings seem intricate, merely because they are general; nor is it easy for the bulk of mankind to distinguish, in a great number of particulars, that common circumstance in which they all agree, or to extract it, pure and unmixt, from the other superfluous circumstances. Every judgment or conclusion with them is particular. They cannot enlarge their view to those universal propositions, which comprehend under them an infinite number of individuals, and include a whole science in a single theorem. Their eye is confounded with such an extensive prospect; and the conclusions derived from it, even though clearly expressed seem intricate and obscure."—Hume's *Political Discourses.*

When the celebrated Vieta shewed algebraists, that by substituting in their investigations letters of the alphabet, instead of known quantities, they might render the solution of every problem subservient to the discovery of a general truth, he did not increase the difficulty of algebraical reasonings; he only enlarged the signification of the terms in which they were expressed. And if, in teaching that science, it is found expedient to accustom students to solve problems by means of the particular numbers which are given, before they are made acquainted with literal or specious arithmetic, it is not because the former processes are less intricate than the latter, but because their scope and utility are more obvious, and because it is more easy to illustrate, by examples than by words, the difference between a particular conclusion, and a general theorem.

The difference between the intellectual processes of the vulgar and of the philosopher, is perfectly analogous to that between the two states of the algebraical art before and after the time of Vieta; the general terms which are used in the various sciences, giving to those who can employ them with correctness and dexterity, the same sort of advantage over the uncultivated sagacity of the bulk of mankind, which the expert algebraist possesses over the arithmetical accomptant.

If the foregoing doctrine be admitted as just, it exhibits a view of the utility of language, which appears to me to be peculiarly striking and beautiful; as it shews that the same faculties which, without the use of signs, must necessarily have been limited to the consideration of individual objects and particular events, are, by means of signs, fitted to embrace, without effort, those comprehensive theorems, to the discovery of which, in detail, the united efforts of the whole human race would have been unequal. The advantage our animal strength acquires by the use of mechanical engines, exhibits but a faint image of that increase of our intellectual capacity which we owe to language.—It is this increase of our natural powers or comprehension, which seems to be the principal foundation of the pleasure we receive from the discovery of general theorems. Such a discovery gives us at once the command of an infinite variety of particular truths, and communicates to the mind a sentiment of its own power, not unlike to what we feel when we contemplate the magnitude of those physical effects, of which we have acquired the command by our mechanical contrivances.

It may perhaps appear, at first, to be a farther consequence of the principles I have been endeavouring to establish, that the difficulty of philosophical discoveries is much less than is commonly imagined; but the truth is, it only follows from them, that this difficulty is of a different nature, from what we are apt to suppose on a superficial view of the subject. To employ, with skill, the very delicate instrument which nature has made essentially subservient to general reasoning, and to guard against the errours which result from an injudicious use of it, require an uncommon capacity of patient attention, and a cautious circumspection in conducting our various intellectual processes, which can only be acquired by habits of philosophical reflection. To assist and direct us in making this acquisition ought to form the most important branch of a rational logic; a science of far more extensive utility, and of which the principles lie much deeper in the philosophy of the human mind, than the trifling art which is commonly dignified with that name. The branch in particular to which the foregoing observations more immediately relate, must for ever remain in its infancy, till a most difficult and important desideratum in the history of the mind is supplied, by an explanation of the gradual steps, by which it acquires the use of the various classes of words which compose the language of a cultivated and enlightened people. Of some of the errours in reasoning to which we are exposed by an incautious use of words, I took notice in the preceding section, and I shall have occasion afterwards to treat the same subject more in detail in a subsequent part of my work.

SECTION VI.

Of the Errours to which we are liable in Speculation, and in the Conduct of Affairs, in consequence of a rash Application of general Principles.

It appears sufficiently from the reasonings which I offered in the preceding Section, how important are the advantages which the philosopher acquires, by quitting the study of particulars, and directing his attention to general principles. I flatter myself it appears farther, from the same reasonings, that it is in consequence of the use of language alone, that the human mind is rendered capable of these comprehensive speculations.

In order, however, to proceed with safety in the use of general principles, much caution and address are necessary, both in establishing their truth, and in applying them to practice. Without a proper attention to the circumstances by which their application to particular cases must be modified, they will be a perpetual source of mistake, and of disappointment, in the conduct of affairs, however rigidly just they may be in themselves, and however accurately we may reason from them. If our general principles happen to be false, they will involve us in errours, not only of conduct but of speculation; and our errours will be the more numerous, the more comprehensive the principles are on which we proceed.

To illustrate these observations fully, would lead to a minuteness of disquisition inconsistent with my general plan, and I shall therefore, at present, confine myself to such remarks as appear to be of most essential importance.

And, in the first place, it is evidently impossible to establish solid general principles, without the previous study of particulars; in other words, it is necessary to begin with the examination of individual objects, and individual events, in order to lay a ground-work of accurate classification, and for a just investigation of the laws of nature. It is in this way only that we can expect to arrive at general principles, which may be safely relied on, as guides to the knowledge of particular truths: and unless our principles admit of such a practical application, however beautiful they may appear to be in theory, they are of far less value than the limited acquisitions of the vulgar. The truth of these remarks is now so universally admitted, and is indeed so obvious in itself, that it would be superfluous to multiply words in supporting them; and I should scarcely have thought of stating them in this Chapter, if some of the most celebrated philosophers of antiquity had not been led to dispute them, in consequence of the mistaken opinions which they entertained concerning the nature of universals. Forgetting that *genera* and *species* are mere arbitrary creations which the human mind forms, by withdrawing the attention from the distinguishing qualities of objects, and giving a common name to their resembling qualities, they conceived universals to be real existences, or (as they expressed it) to be the essences of individuals; and flattered themselves with the belief, that by directing their attention to these essences in the first instance, they might be enabled to penetrate the secrets of the universe, without submitting to the study of nature in detail. These errours, which were common to the Platonists and the Peripatetics, and which both of them seem to have adopted from the Pythagorean school, contributed, perhaps more than any thing else, to retard the progress of the ancients in physical knowledge. The late learned Mr. Harris is almost the only author of the present age who has ventured to defend this plan of philosophizing, in opposition to that which has been so successfully followed by the disciples of lord Bacon.

"The Platonists," says he, "considering science as something ascertained, definite, and steady, would admit nothing to be its object "which was vague, indefinite, and passing. For this reason they "excluded all individuals or objects of sense, and (as Ammonius ex-"presses it) raised themselves in their contemplations from beings "particular to beings universal, and which, from their own nature, "were eternal and definite."—"Consonant to this was the advice of "Plato, with respect to the progress of our speculations and inqui-"ries, to descend from those higher genera, which include many "subordinate species, down to the lowest rank of species, those "which include only individuals. But here it was his opinion, that "our inquiries should stop, and, as to individuals, let them wholly "alone; because of these there could not possibly be any science."*

"Such," continues this author, "was the method of ancient phi-"losophy. The fashion, at present, appears to be somewhat altered,

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* Harris's Three Treatises, pages 341, 342.

"and the business of philosophers to be little else than the collecting from every quarter, into voluminous records, an infinite number of sensible, particular, and unconnected facts, the chief effect "of which is to excite our admiration."—In another part of his works the same author observes, that "the mind, truly wise, quitting the study of particulars, as knowing their multitude to be infinite and incomprehensible, turns its intellectual eye to what is "general and comprehensive, and through generals learns to see, "and recognise whatever exists."*

If we abstract from these obvious errours of the ancient philosophers, with respect to the proper order to be observed in our inquiries, and only suppose them to end where the Platonists said that they should begin, the magnificent encomiums they bestowed on the utility of those comprehensive truths which form the object of science (making allowance for the obscure and mysterious terms in which they expressed them) can scarcely be regarded as extravagant. It is probable that from a few accidental instances of successful investigation, they had been struck with the wonderful effect of general principles in increasing the intellectual power of the human mind; and, misled by that impatience in the study of particulars which is so often connected with the consciousness of superiour ability, they laboured to persuade themselves, that, by a life devoted to abstract meditation, such principles might be rendered as immediate objects of intellectual perception, as the individuals which compose the material world are of our external senses. By connecting this opinion with their other doctrines concerning universals, they were unfortunately enabled to exhibit it in so mysterious a form, as not only to impose on themselves, but to perplex the understandings of all the learned in Europe, for a long succession of ages.

The conclusion to which we are led by the foregoing observations, is, that the foundation of all human knowledge must be laid in the examination of particular objects and particular facts; and that it is only as far as our general principles are resolvable into these primary elements, that they possess either truth or utility. It must not, however, be understood to be implied in this conclusion, that all our knowledge must ultimately rest on our own proper experience. If this were the case, the progress of science, and the progress of human improvement, must have been wonderfully retarded: for, if it had been necessary for each individual to form a classification of objects, in consequence of observations and abstractions of his own, and to infer from the actual examination of particular facts, the general truths on which his conduct proceeds, human affairs would at this day remain nearly in the same state to which they were brought by the experience of the first generation. In fact, this is very nearly the situation of the species in all those parts of the world, in which the existence of the race depends on the separate efforts which each individual makes, in procuring for himself the necessaries of life; and in which, of consequence, the habits and acquirements of each individual must be the result of his own personal experience. In a cultivated society, one of the first acquisitions which children make, is the use of language; by which means they are familiarized, from their earliest years, to the consideration of classes of objects, and of general truths, and before that time of life at which the savage is possessed of the knowledge necessary for his own preservation, are enabled to appropriate to themselves the accumulated discoveries of ages.

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* Harris's Three Treatises, p. 227.

Notwithstanding, however, the stationary condition in which the race must of necessity continue, prior to the separation of arts and professions, the natural disposition of the mind to ascend from particular truths to general conclusions, could not fail to lead individuals, even in the rudest state of society, to collect the results of their experience, for their own instruction and that of others. But, without the use of general terms, the only possible way of communicating such conclusions would be by means of some particular example, of which the general application was striking and obvious. In other words, the wisdom of such ages will necessarily be expressed in the form of fables or parables, or in the still simpler form of proverbial instances, and not in the scientific form of general maxims. In this way, undoubtedly, much useful instruction, both of a prudential and moral kind, might be conveyed: at the same time, it is obvious, that, while general truths continue to be expressed merely by particular exemplifications, they would afford little or no opportunity to one generation to improve on the speculations of another; as no effort of the understanding could combine them together, or employ them as premises, in order to obtain other conclusions more remote and comprehensive. For this purpose, it is absolutely necessary that the scope or moral of the fable should be separated entirely from its accessary circumstances, and stated in the form of a general proposition.

From what has now been said, it appears, how much the progress of human reason, which necessarily accompanies the progress of society, is owing to the introduction of general terms, and to the use of general propositions. In consequence of the gradual improvements which take place in language as an instrument of thought, the classifications both of things and facts with which the infant faculties of each successive race are conversant, are more just and more comprehensive than those of their predecessors: the discoveries which, in one age, were confined to the studious and enlightened few, becoming, in the next, the established creed of the learned, and in the third, forming part of the elementary principles of education. Indeed, among those who enjoy the advantages of early instruction, some of the most remote and wonderful conclusions of the human intellect are, even in infancy, as completely familiarized to the mind, as the most obvious phenomena which the material world exhibits to their senses.

If these remarks be just, they open an unbounded prospect of intellectual improvement to future ages; as they point out a provision made by nature to facilitate and abridge, more and more, the process of study, in proportion as the truths to be acquired increase in number. Nor is this prospect derived from theory alone. It is encouraged by the past history of all the sciences; in a more particular manner, by that of mathematics and physics, in which the state of discovery, and the prevailing methods of instruction may, at all times, be easily compared together. In this last observation I have been anticipated by a late eminent mathematician, whose eloquent and philosophical statement of the argument cannot fail to carry conviction to those, who are qualified to judge of the facts on which his conclusion is founded:

"To such of my readers, as may be slow in admitting the possibility of this progressive improvement in the human race, allow "me to state, as an example, the history of that science in which "the advances of discovery are the most certain, and in which they "may be measured with the greatest precision.—Those elementary "truths of geometry and of astronomy which, in India and Egypt, "formed an occult science, upon which an ambitious priesthood "founded its influence, were become, in the times of Archimedes "and Hipparchus, the subjects of common education in the public "schools of Greece. In the last century, a few years of study were "sufficient for comprehending all that Archimedes and Hipparchus "knew; and, at present, two years employed under an able teacher, "carry the student beyond those conclusions, which limited the inquiries of Leibnitz and of Newton. Let any person reflect on "these facts: let him follow the immense chain which connects the "inquiries of Euler with those of a Priest of Memphis; let him observe, at each epoch, how genius outstrips the present age, and "how it is overtaken by mediocrity in the next; he will perceive, "that nature has furnished us with the means of abridging and facilitating our intellectual labour, and that there is no reason for apprehending that such simplifications can ever have an end. He "will perceive, that at the moment when a multitude of particular "solutions, and of insulated facts, begin to distract the attention, and "to overcharge the memory, the former gradually lose themselves "in one general method, and the latter unite in one general law; "and that these generalizations continually succeeding one to another, like the successive multiplications of a number by itself, have "no other limit, than that infinity which the human faculties are "unable to comprehend."*

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* See Note (M.)

SECTION VII.

Continuation of the same Subject.—Differences in the Intellectual Characters of Individuals, arising from their different Habits of Abstraction and Generalisation.

In mentioning as one of the principal effects of civilization, its tendency to familiarize the mind to general terms, and to general propositions, I did not mean to say, that this influence extends equally to all the classes of men in society. On the contrary, it is evidently confined, in a great measure, to those who receive a liberal education; while the minds of the lower orders, like those of savages, are so habitually occupied about particular objects and particular events, that, although they are sometimes led, from imitation, to employ general expressions, the use which they make of them is much more the result of memory than judgment; and it is but seldom that they are able to comprehend fully any process of reasoning in which they are involved.

It is hardly necessary for me to remark, that this observation, with respect to the incapacity of the vulgar for general speculations, (like all observations of a similar nature,) must be received with some restrictions. In such a state of society as that in which we live, there is hardly any individual to be found, to whom some general terms, and some general truths are not perfectly familiar; and, therefore, the foregoing conclusions are to be considered as descriptive of those habits of thought alone, which are most prevalent in their mind. To abridge the labour of reasoning, and of memory, by directing the attention to general principles, instead of particular truths, is the professed aim of all philosophy; and according as individuals have more or less of the philosophic spirit, their habitual speculations (whatever the nature of their pursuits may be) will relate to the former, or to the latter, of these objects.

There are, therefore, among the men who are accustomed to the exercise of their intellectual powers, two classes, whose habits of thought are remarkably distinguished from each other; the one class comprehending what we commonly call men of business, or, more properly, men of detail; the other, men of abstraction; or, in other words, philosophers.

The advantages which, in certain respects, the latter of these possess over the former, have been already pointed out; but it must not be supposed, that these advantages are always purchased without some inconvenience. As the solidity of our general principles depends on the accuracy of the particular observations into which they are ultimately resolvable, so their utility is to be estimated by the practical applications of which they admit: and it unfortunately happens, that the same turn of mind which is favourable to philosophical pursuits, unless it be kept under proper regulation, is extremely apt to disqualify us for applying our knowledge to use, in the exercise of the arts, and in the conduct of affairs.

In order to perceive the truth of these remarks, it is almost sufficient to recollect, that as classification, and, of consequence, general reasoning, presuppose the exercise of abstraction, a natural disposition to indulge in them, cannot fail to lead the mind to overlook the specific differences of things, in attending to their common qualities. To succeed, however, in practice, a familiar and circumstantial acquaintance with the particular objects which fall under our observation, is indispensably necessary.

But, farther: As all general principles are founded on classifications which imply the exercise of abstraction, it is necessary to regard them, in their practical applications, merely as approximations to the truth; the defects of which must be supplied by habits acquired by personal experience. In considering, for example, the theory of the mechanical powers, it is usual to simplify the objects of our conception, by abstracting from friction, and from the weight of the different parts of which they are composed. Levers are considered as mathematical lines, perfectly inflexible, and ropes, as mathematical lines, perfectly flexible; and by means of these, and similar abstractions, a subject, which is in itself extremely complicated, is brought within the reach of elementary geometry. In the theory of politics, we find it necessary to abstract from many of the peculiarities which distinguish different forms of government from each other, and to reduce them to certain general classes, according to their prevailing tendency. Although all the governments we have ever seen, have had more or less of mixture in their composition, we reason concerning pure monarchies, pure aristocracies, and pure democracies, as if there really existed political establishments corresponding to our definitions. Without such a classification, it would be impossible for us to fix our attention, amidst the multiplicity of particulars which the subject presents to us, or to arrive at any general principles, which might serve to guide our inquiries in comparing different institutions together.

It is for a similar reason, that the speculative farmer reduces the infinite variety of soils to a few general descriptions; the physician, the infinite variety of bodily constitutions to a few temperaments; and the moralist, the infinite variety of human characters to a few of the ruling principles of action.

Notwithstanding, however, the obvious advantages we derive from these classifications, and the general conclusions to which they lead, it is evidently impossible, that principles, which derived their origin from efforts of abstraction, should apply literally to practice; or, indeed, that they should afford us any considerable assistance in conduct, without a certain degree of practical and experimental skill. Hence it is, that the mere theorist so frequently exposes himself, in real life, to the ridicule of men whom he despises; and in the general estimation of the world, falls below the level of the common drudges in business and the arts. The walk, indeed, of these unenlightened practitioners, must necessarily be limited by their accidental opportunities of experience; but, so far as they go, they operate with facility and success; while the merely speculative philosopher, although possessed of principles which enable him to approximate to the truth in an infinite variety of untried cases, and although he sees, with pity, the narrow views of the multitude, and the ludicrous pretensions with which they frequently oppose their trifling successes to his theoretical speculations, finds himself perfectly at a loss, when he is called upon, by the simplest occurrences of ordinary life, to carry his principles into execution. Hence the origin of that maxim, "which" (as Mr. Hume remarks) "has been so industriously propagated by "the dunces of every age, that a man of genius is unfit for business."

In what consists practical or experimental skill, it is not easy to explain completely; but, among other things, it obviously implies a talent for minute and comprehensive and rapid observation; a memory, at once retentive and ready, in order to present to us accurately, and without reflection, our theoretical knowledge; a presence of mind, not to be disconcerted by unexpected occurrences; and, in some cases, an uncommon degree of perfection in the external senses, and in the mechanical capacities of the body. All these elements of practical skill, it is obvious, are to be acquired only by habits of active exertion, and by a familiar acquaintance with real occurrences; for, as all the practical principles of our nature, both intellectual and animal, have a reference to particulars, and not to generals, so it is in the active scenes of life alone, and amidst the details of business, that they can be cultivated and improved.

The remarks which have been already made, are sufficient to illustrate the impossibility of acquiring a talent for business, or for any of the practical arts of life, without actual experience. They shew also, that mere experience, without theory, may qualify a man, in certain cases, for distinguishing himself in both. It is not, however, to be imagined, that in this way individuals are to be formed for the uncommon, or for the important situations of society, or even for enriching the arts by new inventions; for, as their address and dexterity are founded entirely on imitation, or derived from the lessons which experience has suggested to them, they cannot possibly extend to new combinations of circumstances. Mere experience, therefore, can, at best, prepare the mind for the subordinate departments of life; for conducting the established routine of business, or for a servile repetition in the arts of common operations.

In the character of Mr. George Grenville, which Mr. Burke introduced in his celebrated speech on American Taxation, a lively picture is drawn of the insufficiency of mere experience to qualify a man for new and untried situations in the administration of government. The observations he makes on this subject, are expressed with his usual beauty and felicity of language, and are of so general a nature, that, with some trifling alterations, they may be extended to all the practical pursuits of life.

"Mr. Grenville was bred to the law, which is, in my opinion, one "of the first and noblest of human sciences; a science which does "more to quicken and invigorate the understanding, than all the "other kinds of learning put together; but it is not apt, except in "persons very happily born, to open and to liberalize the mind exactly in the same proportion. Passing from that study, he did not "go very largely into the world, but plunged into business; I mean, "into the business of office, and the limited and fixed methods "and forms established there. Much knowledge is to be had, undoubtedly, in that line; and there is no knowledge which is not "valuable. But it may be truly said, that men too much conversant in office, are rarely minds of remarkable enlargement. Their "habits of office are apt to give them a turn to think the substance "of business not to be much more important, than the forms in "which it is conducted. These forms are adapted to ordinary occasions; and, therefore, persons who are nurtured in office, do "admirably well, as long as things go on in their common order; but "when the high roads are broken up, and the waters out, when a "new and troubled scene is opened, and the file affords no precedent, "then it is, that a greater knowledge of mankind, and a far more "extensive comprehension of things, is requisite, than ever office "gave, or than office can ever give."

Nor is it in new combinations of circumstances alone that general principles assist us in the conduct of affairs; they render the application of our practical skill more unerring, and more perfect. For, as general principles limit the utility of practical skill to supply the imperfections of theory, they diminish the number of cases in which this skill is to be employed; and thus, at once, facilitate its improvement, wherever it is requisite, and lessen the errours to which it is liable, by contracting the field within which it is possible to commit them.

It would appear then, that there are two opposite extremes into which men are apt to fall, in preparing themselves for the duties of active life. The one arises from habits of abstraction and generalization carried to an excess; the other from a minute, an exclusive, and an unenlightened attention to the objects and events which happen to fall under their actual experience.

In a perfect system of education, care should be taken to guard against both extremes, and to unite habits of abstraction with habits of business, in such a manner as to enable men to consider things, either in general, or in detail, as the occasion may require. Whichever of these habits may happen to gain an undue ascendant over the mind, it will necessarily produce a character limited in its powers, and fitted only for particular exertions. Hence some of the apparent inconsistencies which we may frequently remark in the intellectual capacities of the same person. One man from an early indulgence in abstract speculation, possesses a knowledge of general principles, and a talent for general reasoning, united with a fluency and eloquence in the use of general terms, which seem, to the vulgar, to announce abilities fitted for any given situation in life: while, in the conduct of the simplest affairs, he exhibits every mark of irresolution and incapacity. Another not only acts with propriety and skill, in circumstances which require a minute attention to details, but possesses an accuteness of reasoning, and a facility of expression on all subjects, in which nothing but what is particular is involved; while, on general topics, he is perfectly unable either to reason, or to judge. It is this last turn of mind, which I think we have, in most instances, in view, when we speak of good sense, or common sense, in opposition to science and philosophy. Both philosophy and good sense imply the exercise of our reasoning powers; and they differ from each other only, according as these powers are applied to particulars or to generals. It is on good sense (in the acceptation in which I have now explained the term) that the success of men in the inferiour walks of life chiefly depends; but, that it does not always indicate a capacity for abstract science, or for general speculation, or for able conduct in situations which require comprehensive views, is matter even of vulgar remark.

Although, however, each of these defects has a tendency to limit the utility of the individuals, in whom it is to be found, to certain stations in society, no comparison can be made, in point of original value, between the intellectual capacities of the two classes of men to which they characteristically belong. The one is the defect of a vigorous, an ambitious, and a comprehensive genius, improperly directed; the other, of an understanding, minute and circumscribed in its views, timid in its exertions, and formed for servile imitation. Nor is the former defect, (however difficult it may be to remove it when confirmed by long habit,) by any means so incurable as the latter; for it arises not from original constitution, but from some fault in early education; while every tendency to the opposite extreme is more or less characteristical of a mind, useful indeed, in a high degree, when confined to its proper sphere, but destined, by the hand that formed it, to borrow its lights from another.

As an additional proof of the natural superiority which men of general views possess over the common drudges in business, it may be farther observed, that the habits of inattention incident to the former, arise in part from the little interest which they take in particular objects and particular occurrences, and are not wholly to be ascribed to an incapacity of attention. When the mind has been long accustomed to the consideration of classes of objects and of comprehensive theorems, it cannot, without some degree of effort, descend to that humble walk of experience, or of action, in which the meanest of mankind are on a level with the greatest. In important situations, accordingly, men of the most general views are found not to be inferiour to the vulgar in their attention to details; because the objects and occurrences which such situations present, rouse their passions, and interest their curiosity, from the magnitude of the consequences to which they lead.

When theoretical knowledge and practical skill are happily combined in the same person, the intellectual power of man appears in its full perfection, and fits him equally to conduct, with a masterly hand, the details of ordinary business, and to contend successfully with the untried difficulties of new and hazardous situations. In conducting the former, mere experience may frequently be a sufficient guide, but experience and speculation must be combined together to prepare us for the latter. "Expert men," says Lord Bacon, "can execute and judge of particulars one by one; but the general counsels, and the plots, and the marshalling of affairs, come best from those that are learned."

SECTION VIII.

Continuation of the same Subject—Use and Abuse of general Principles in Politics.*

The foregoing remarks, on the dangers to be apprehended from a rash application of general principles, hold equally with respect to most of the practical arts. Among these, however, there is one of far superiour dignity to the rest, which, partly on account of its importance, and partly on account of some peculiarities in its nature, seems to be entitled to a more particular consideration. The art I allude to, is that of Legislation; an art which differs from all others in some very essential respects, and to which, the reasonings in the last Section must be applied with many restrictions.

Before proceeding farther, it is necessary for me to premise, that it is chiefly in compliance with common language and common prejudices, that I am sometimes led, in the following observations, to contrast theory with experience. In the proper sense of the word Theory, it is so far from standing in opposition to experience, that it implies a knowledge of principles, of which the most extensive experience alone could put us in possession. Prior to the time of Lord Bacon, indeed, an acquaintance with facts was not considered as essential to the formation of theories; and from these ages has descended to us an indiscriminate prejudice against general principles, even in those cases in which they have been fairly obtained in the way of induction.

But not to dispute about words, there are plainly two sets of political reasoners; one of which consider the actual institutions of mankind as the only safe foundation for our conclusions, and think every plan of legislation chimerical, which is not copied from one which has already been realized; while the other apprehend that, in many cases, we may reason safely *a priori* from the known principles of human nature, combined with the particular circumstances of the times. The former are commonly understood as contending for experience in opposition to theory; the latter are accused of trusting to theory unsupported by experience: but it ought to be remembered, that the political theorist, if he proceeds cautiously and philosophically, founds his conclusions ultimately on experience, no less than the political empiric;—as the astronomer, who predicts an eclipse from his knowledge of the principles of the science, rests his expectation of the event on facts which have been previously ascertained by observation, no less than if he inferred it, without any reasoning, from his knowledge of a cycle.

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* The events which have happened since the publication of the former edition of this volume in 1792, might have enabled me to confirm many of the observations in this section, by an appeal to facts still fresh in the recollection of my readers; and in one or two instances by slight verbal corrections, to guard against the possibility of uncandid misinterpretation: but, for various reasons, which it is unnecessary to state at present, I feel it to be a duty which I owe to myself, to send the whole discussion again to the press in its original form. That the doctrine it inculcates is favourable to the good order and tranquillity of society, cannot be disputed; and, as far as I myself am personally interested, I have no wish to vitiate the record which it exhibits of my opinions.

On some points which are touched upon very slightly here, I have explained myself more fully, in the fourth section of my Biographical Account of Mr. Smith, read before the Royal Society of Edinburgh in 1793, and published in the third volume of their Transactions.

There is, indeed, a certain degree of practical skill which habits of business alone can give, and without which the most enlightened politician must always appear to disadvantage when he attempts to carry his plans into execution. And as this skill is often (in consequence of the ambiguity of language) denoted by the word Experience, while it is seldom possessed by those men who have most carefully studied the theory of legislation, it has been very generally concluded, that politics is merely a matter of routine, in which philosophy is rather an obstacle to success. The statesman who has been formed among official details, is compared to the practical engineer; the speculative legislator, to the theoretical mechanician who has passed his life among books and diagrams.—In order to ascertain how far this opinion is just, it may be of use to compare the art of legislation with those practical applications of mechanical principles, by which the opposers of political theories have so often endeavoured to illustrate their reasonings.

I. In the first place, then, it may be remarked, that the errours to which we are liable, in the use of general mechanical principles, are owing, in most instances, to the effect which habits of abstraction are apt to have, in withdrawing the attention from those applications of our knowledge, by which alone we can learn to correct the imperfections of theory.—Such errours, therefore, are, in a peculiar degree, incident to men who have been led by natural taste, or by early habits, to prefer the speculations of the closet to the bustle of active life, and to the fatigue of minute and circumstantial observation.

In politics, too, one species of principles is often misapplied from an inattention to circumstances; those which are deduced from a few examples of particular governments, and which are occasionally quoted as universal political axioms, which every wise legislator ought to assume as the ground-work of his reasonings. But this abuse of general principles should by no means be ascribed, like the absurdities of the speculative mechanician, to over-refinement, and the love of theory; for it arises from weaknesses, which philosophy alone can remedy, an unenlightened veneration for maxims which are supposed to have the sanction of time in their favour, and a passive acquiescence in received opinions.

There is another class of principles, from which political conclusions have sometimes been deduced, and which, notwithstanding the common prejudice against them, are a much surer foundation for our reasonings: I allude, at present, to those principles which we obtain from an examination of the human constitution, and of the general laws which regulate the course of human affairs; principles, which are certainly the result of a much more extensive induction, than any of the inferences that can be drawn from the history of actual establishments.

In applying, indeed, such principles to practice, it is necessary (as well as in mechanics) to pay attention to the peculiarities of the case, but it is by no means necessary to pay the same scrupulous attention to minute circumstances, which is essential in the mechanical arts, or in the management of private business. There is even a danger of dwelling too much on details, and of rendering the mind incapable of those abstract and comprehensive views of human affairs, which can alone furnish the statesman with fixed and certain maxims for the regulation of his conduct. "When a man, (says "Mr. Hume) deliberates concerning his conduct in any *particular* "affair, and forms schemes in politics, trade, œconomy, or any business in life, he never ought to draw his arguments too fine, or "connect too long a chain of consequences together. Something is "sure to happen, that will disconcert his reasoning, and produce an "event different from what he expected. But when we reason "upon *general* subjects, one may justly affirm, that our speculations "can scarce ever be too fine, provided they are just; and that the "difference betwixt a common man and a man of genius, is chiefly "seen in the shallowness or depth of the principles upon which "they proceed.—'Tis certain that general principles, however "intricate they may seem, must always, if they are just and sound, "prevail in the general course of things, though they may fail in "particular cases, and it is the chief business of philosophers to "regard the general course of things. I may add, that it is also the "chief business of politicians; especially in the domestic government of the state, where the public good, which is, or ought to "be, their object, depends on the concurrence of a multitude of "cases, not, as in foreign politics, upon accidents, and chances, and "the caprices of a few persons."*

II. The difficulties which, in the mechanical arts, limit the application of general principles, remain invariably the same from age to age: and whatever observations we have made on them in the course of our past experience, lay a sure foundation for future practical skill, and supply, in so far as they reach, the defects of our theories. In the art of government, however, the practical difficulties which occur are of a very different nature. They do not present to the statesman the same steady subject of examination, which the effects of friction do to the engineer. They arise chiefly from the passions and opinions of men, which are in a state of perpetual change; and, therefore, the address which is necessary to overcome them depends less on the accuracy of our observations with respect to the past, than on the sagacity of our conjectures with respect to the future. In the present age, more particularly, when the rapid communication, and the universal diffusion of knowledge, by means of the press, render the situation of political societies essentially different from what it ever was formerly, and secure infallibly, against every accident, the progress of human reason; we may venture to predict, that they are to be the most successful statesmen, who, paying all due regard to past experience, search for the rules of their conduct chiefly in the peculiar circumstances of their own times, and in an enlightened anticipation of the future history of mankind.

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* Political Discourses.

III. In the mechanical arts, if, at any time, we are at a loss about the certainty of a particular fact, we have it always in our power to bring it to the test of experiment. But it is very seldom that we can obtain in this way any useful conclusion in politics: not only because it is difficult to find two cases in which the combinations of circumstances are precisely the same, but because our acquaintance with the political experience of mankind is much more imperfect than is commonly imagined. By far the greater part of what is called matter of fact in politics, is nothing else than theory; and very frequently, in this science, when we think we are opposing experience to speculation, we are only opposing one theory to another.

To be satisfied of the truth of this observation, it is almost sufficient to recollect, how extremely difficult it is to convey, by a general description, a just idea of the actual state of any government. That every such description must necessarily be more or less theoretical, will appear from the following remarks.

1. Of the governments which have hitherto appeared in the history of mankind, few or none have taken their rise from political wisdom, but have been the gradual result of time and experience, of circumstances and emergencies. In process of time, indeed, every government acquires a systematical appearance: for, although its different parts arose from circumstances which may be regarded as accidental and irregular, yet there must exist, among these parts, a certain degree of consistency and analogy. Wherever a government has existed for ages, and men have enjoyed tranquillity under it, it is a proof that its principles are not essentially at variance with each other. Every new institution which was introduced, must have had a certain reference to the laws and usages existing before, otherwise it could not have been permanent in its operation. If any one, contrary to the spirit of the rest, should have occasionally mingled with them, it must soon have fallen into desuetude and oblivion; and those alone would remain, which accorded in their

general tendency. "Quæ usu obtinuere," says Lord Bacon, "si "non bona, at saltem apta inter se sunt."

The necessity of studying particular constitutions of government, by the help of systematical descriptions of them, (such descriptions, for example, as are given of that of England by Montesquieu and Blackstone) arises from the same circumstances, which render it expedient, in most instances, to study particular languages by consulting the writings of grammarians. In both cases, the knowledge we wish to acquire, comprehends an infinite number of particulars, the consideration of which, in detail, would distract the attention, and overload the memory. The systematical descriptions of politicians, like the general rules of grammarians, are in a high degree useful for arranging and simplifying the objects of our study; but in both cases, we must remember, that the knowledge we acquire in this manner is to be received with great limitations, and that it is no more possible to convey, in a systematical form, a just and complete idea of a particular government, than it is to teach a language completely by means of general rules, without any practical assistance from reading or conversation.

2. The nature and spirit of a government, as it is actually exercised at a particular period, cannot always be collected, perhaps it can seldom be collected, from an examination of written laws, or of the established forms of a constitution. These may continue the same for a long course of ages, while the government may be modified in its exercise, to a great extent, by gradual and undescribable alterations in the ideas, manners, and character, of the people, or by a change in the relations which different orders of the community bear to each other. In every country whatever, beside the established laws, the political state of the people is affected by an infinite variety of circumstances, of which no words can convey a conception, and which are to be collected only from actual observation. Even in this way, it is not easy for a person who has received his education in one country, to study the government of another; on account of the difficulty which he must necessarily experience, in entering into the associations which influence the mind under a different system of manners, and in ascertaining (especially upon political subjects) the complex ideas conveyed by a foreign language.

In consequence of the causes which have now been mentioned, it sometimes happens, that there are essential circumstances in the actual state of a government, about which the constitutional laws are not only silent, but which are directly contrary to all the written laws, and to the spirit of the constitution as delineated by theoretical writers.

IV. The art of government differs from the mechanical arts in this, that, in the former, it is much more difficult to refer effects to their causes, than in the latter; and, of consequence, it rarely happens, even when we have an opportunity of seeing a political experiment made, that we can draw from it any certain inference, with respect to the justness of the principles by which it was suggested. In those complicated machines, to which the structure of civil society has been frequently compared, as all the different parts of which they are composed are subjected to physical laws, the errours of the artist must necessarily become apparent in the last result; but in the political system, as well as in the animal body, where the general constitution is sound and healthy, there is a sort of *vis medicatrix*, which is sufficient for the cure of partial disorders; and in the one case, as well as in the other, the errours of human art are frequently corrected and concealed by the wisdom of nature. Among the many false estimates which we daily make of human ability, there is perhaps none more groundless than the exaggerated conceptions we are apt to form of that species of political wisdom which is supposed to be the fruit of long experience and of professional habits. "Go;" (said the chancellor Oxenstiern to his son, when he was sending him to a congress of ambassadors, and when the young man was expressing his diffidence of his own abilities for such an employment;) "Go, and see with your own eyes, *Quam parva sapientia regitur mundus!*" The truth is, (however paradoxical the remark may appear at first view,) that the speculative errours of statesmen are frequently less sensible in their effects, and, of consequence, more likely to escape without detection, than those of individuals who occupy inferiour stations in society. The effects of misconduct in private life are easily traced to their proper source, and therefore the world is seldom far wrong in the judgments which it forms of the prudence or of the imprudence of private characters. But in considering the affairs of a great nation, it is so difficult to trace events to their proper causes, and to distinguish the effects of political wisdom, from those which are the natural result of the situation of the people, that it is scarcely possible, excepting in the case of a very long administration, to appreciate the talents of a statesman from the success or the failure of his measures. In every society, too, which, in consequence of the general spirit of its government, enjoys the blessings of tranquillity and liberty, a great part of the political order which we are apt to ascribe to legislative sagacity, is the natural result of the selfish pursuits of individuals; nay, in every such society, (as I already hinted,) the natural tendency to improvement is so strong, as to overcome many powerful obstacles, which the imperfection of human institutions opposes to its progress.

From these remarks, it seems to follow, that, although in the mechanical arts, the errours of theory may frequently be corrected by repeated trials, without having recourse to general principles, yet, in the machine of government, there is so great a variety of powers at work, beside the influence of the statesman, that it is vain to expect the art of legislation should be carried to its greatest possible perfection by experience alone.

Still, however, it may be said, that in the most imperfect governments of modern Europe, we have an experimental proof, that they secure, to a very great degree, the principal objects of the social union. Why hazard these certain advantages, for the uncertain effects of changes, suggested by mere theory; and not rest satisfied with a measure of political happiness, which appears, from the history of the world, to be greater than has commonly fallen to the lot of nations?

With those who would carry their zeal against reformation so far, it is impossible to argue; and it only remains for us to regret, that the number of such reasoners has, in all ages of the world, been so great, and their influence on human affairs so extensive.

"There are some men," (says Dr. Johnson,) "of narrow views, "and grovelling conceptions, who, without the instigation of per"sonal malice, treat every new attempt as wild and chimerical; and "look upon every endeavour to depart from the beaten track, as the "rash effort of a warm imagination, or the glittering speculation of "an exalted mind, that may please and dazzle for a time, but can "produce no real or lasting advantage.

"These men value themselves upon a perpetual scepticism; "upon believing nothing but their own senses; upon calling for "demonstration where it cannot possibly be obtained; and, some"times, upon holding out against it when it is laid before them; "upon inventing arguments against the success of any new under"taking; and, where arguments cannot be found, upon treating it "with contempt and ridicule.

"Such have been the most formidable enemies of the great be"nefactors of the world; for their notions and discourse are so "agreeable to the lazy, the envious, and the timorous, that they "seldom fail of becoming popular, and directing the opinions of "mankind."*

With respect to this sceptical disposition, as applicable to the present state of society, it is of importance to add, that, in every government, the stability and the influence of established authority must depend on the coincidence between its measures and the tide of public opinion; and that, in modern Europe, in consequence of the invention of printing, and the liberty of the press, public opinion has acquired an ascendant in human affairs, which it never possessed in those states of antiquity, from which most of our political examples are drawn. The danger, indeed, of sudden and rash innovations cannot be too strongly inculcated, and the views of those men who are forward to promote them, cannot be reprobated with too great severity. But it is possible also to fall into the opposite extreme, and to bring upon society the very evils we are anxious to prevent, by an obstinate opposition to those gradual and necessary reformations which the genius of the times demands.

The violent revolutions which, at different periods, have convulsed modern Europe, have arisen, not from a spirit of innovation in sovereigns and statesmen; but from their bigotted attachment to antiquated forms, and to principles borrowed from less enlightened ages. It is this reverence for abuses which have been sanctioned by time, accompanied with an inattention to the progress of public opinion, which has, in most instances, blinded the rulers of mankind, till government has lost all its efficiency; and till the rage of innovation has become too general and too violent, to be satisfied with changes, which, if proposed at an earlier period, would have united, in the support of established institutions, every friend to order, and to the prosperity of his country.

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* Life of Drake, by Dr. Johnson.

These observations I state with the greater confidence, that the substance of them is contained in the following aphorisms of Lord Bacon; a philosopher who (if we except, perhaps, the late Mr. Turgot) seems, more than any other, to have formed enlightened views with respect to the possible attainments of mankind; and whose fame cannot fail to increase as the world grows older, by being attached, not to a particular system of variable opinions, but to the general and infallible progress of human reason.

"Quis novator tempus imitatur, quod novationes ita insinuat, ut "sensus fallant?

"Novator maximus tempus; quidni igitur tempus imitemur?

"Morosa morum retentio res turbulenta est, æque ac novitas.

"Cum per se res mutentur in deterius, si consilio in melius non "mutentur, quis finis erit mali?"

The general conclusion to which these observations lead, is sufficiently obvious; that the perfection of political wisdom does not consist in an indiscriminate zeal against reforms, but in a gradual and prudent accommodation of established institutions to the varying opinions, manners, and circumstances of mankind. In the actual application, however, of this principle, many difficulties occur, which it requires a very rare combination of talents to surmount: more particularly in the present age, when the press has, to so wonderful a degree, emancipated human reason from the tyranny of ancient prejudices, and has roused a spirit of free discussion, unexampled in the history of former times.

That this sudden change in the state of the world should be accompanied with some temporary disorders, is by no means surprising. While the multitude continue imperfectly enlightened, they will be occasionally misled by the artifices of demagogues; and even good men, intoxicated with ideas of theoretical perfection, may be expected sometimes to sacrifice, unintentionally, the tranquillity of their cotemporaries, to an over-ardent zeal for the good of posterity. Notwithstanding, however, these evils, which every friend to humanity must lament, I would willingly believe, that the final effects resulting from this spirit of reformation cannot fail to be favourable to human happiness; and there are some peculiarities in the present condition of mankind, which appear to me to justify more sanguine hopes upon the subject, than it would have been reasonable for a philosopher to indulge at any former period. An attention to these peculiarities is absolutely necessary to enable us to form a competent judgment on the question to which the foregoing observations relate; and it leads to the illustration of a doctrine to which I have frequently referred in this work, the gradual improvement in the condition of the species, which may be expected from the progress of reason and the diffusion of knowledge.

Among the many circumstances favourable to human happiness in the present state of the world, the most important perhaps, is, that the same events which have contributed to loosen the foundations of the ancient fabricks of despotism, have made it practicable in a much greater degree than it ever was formerly, to reduce the principles of legislation to a science, and to anticipate the probable course of popular opinions. It is easy for the statesman to form to himself a distinct and steady idea of the ultimate objects at which a wise legislator ought to aim, and to forsee that modification of the social order, to which human affairs have, of themselves, a tendency to approach; and, therefore, his practical sagacity and address are limited to the care of accomplishing the important ends which he has in view, as effectually and as rapidly as is consistent with the quiet of individuals, and with the rights arising from actual establishments.

In order to lay a solid foundation for the science of politics, the first step ought to be, to ascertain that form of society which is perfectly agreeable to nature and to justice; and what are the principles of legislation necessary for maintaining it. Nor is the inquiry so difficult as might at first be apprehended; for it might be easily shewn, that the greater part of the political disorders which exist among mankind, do not arise from a want of foresight in politicians, which has rendered their laws too general, but from their having trusted too little to the operation of those simple institutions which nature and justice recommend; and, of consequence, that, as society advances to its perfection, the number of laws may be expected to diminish, instead of increasing, and the science of legislation to be gradually simplified.

The Œconomical system which, about thirty years ago, employed the speculations of some ingenious men in France, seems to me to have been the first attempt to ascertain this ideal perfection of the social order; and the light which, since that period, has been thrown on the subject, in different parts of Europe, is a proof of what the human mind is able to accomplish in such inquiries, when it has once received a proper direction. To all the various tenets of these writers, I would, by no means, be understood to subscribe; nor do I consider their system as so perfect in every different part, as some of its most sanguine admirers have represented it to be. A few of the most important principles of political œconomy they have undoubtedly established with demonstrative evidence; but what the world is chiefly indebted to them for, is, the commencement which they have given to a new branch of science, and the plan of investigation which they have exhibited to their successors. A short account of what I conceive to be the scope of their speculations will justify these remarks, and will comprehend every thing which I have to offer at present, in answer to the question by which they were suggested. Such an account I attempt with the greater satisfaction, that the leading views of the earliest and most enlightened patrons of the œconomical system have, in my opinion, been not more misrepresented by its opponents, than misapprehended by some who have adopted its conclusions.*

In the first place, then, I think it of importance to remark, that the object of the œconomical system ought by no means to be confounded (as I believe it commonly is in this country) with that of the Utopian plans of government, which have, at different times, been offered to the world; and which have so often excited the just ridicule of the more sober and reasonable inquirers. Of these plans, by far the greater number proceed on the supposition, that the social order is entirely the effect of human art; and that wherever this order is imperfect, the evil may be traced to some want of foresight on the part of the legislator; or to some inattention of the magistrate to the complicated structure of that machine of which he regulates the movements. The projects of reform, therefore, which such plans involve, are, in general, well entitled to all the ridicule and contempt they have met with; in as much as they imply an arrogant and presumptuous belief in their authors of the superiority of their own political sagacity to the accumulated wisdom of former ages. The case is very different with the œconomical system; of which the leading views (so far as I am able to judge) proceed on the two following suppositions: First, that the social order is, in the most essential respects, the result of the wisdom of nature, and not of human contrivance; and, therefore, that the proper business of the politician, is not to divide his attention among all the different parts of a machine, which is by far too complicated for his comprehension; but by protecting the rights of individuals, and by allowing to each as complete a liberty as is compatible with the perfect security of the rights of his fellow-citizens, to remove every obstacle which the prejudices and vices of men have opposed to the establishment of that order which society has a tendency to assume. Secondly, that, in proportion to the progress and the diffusion of knowledge, those prejudices, on a skilful management of which all the old systems of policy proceeded, must gradually disappear; and, consequently, that (whatever may be his predilection for ancient usages) the inevitable course of events imposes on the politician the necessity of forming his measures on more solid and permanent principles, than those by which the world has hitherto been governed. Both of these suppositions are of modern origin. The former, so far as I know, was first stated and illustrated by the French Œconomists. The latter has been obviously suggested by that rapid improvement, which has actually taken place in every country of Europe where the press has enjoyed a moderate degree of liberty.

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* See Note (N.)

It may be farther remarked, with respect to the greater part of the plans proposed by Utopian projectors, that they proceed on the supposition of a miraculous reformation in the moral character of a people, to be effected by some new system of education. All such plans (as Mr. Hume has justly observed) may be safely abandoned as impracticable and visionary. But this objection does not apply to the œconomical system, the chief expedient of which, for promoting moral improvement, is not that education which depends on the attention and care of our instructors, but an education which necessarily results from the political order of society. "How ineffectual" (said the Roman poet) "are the wisest laws, if they be not supported by good morals!" How ineffectual (say the Œconomists) are all our efforts to preserve the morals of a people, if the laws which regulate the political order, doom the one half of mankind to indigence, to fraud, to servility, to ignorance, to superstition, and the other half to be the slaves of all the follies and vices which result from the insolence of rank, and the selfishness of opulence? Suppose for a moment, that the inordinate accumulation of wealth in the hands of individuals, which we every where meet with in modern Europe, were gradually diminished by abolishing the law of entails, and by establishing a perfect freedom of commerce and of industry; it is almost self-evident, that this simple alteration in the order of society, an alteration, which has been often demonstrated to be the most effectual and the most infallible measure for promoting the wealth and population of a country, would contribute, more than all the labours of moralists, to secure the virtue and the happiness of all the classes of mankind. It is worthy too of remark, that such a plan of reformation does not require, for its accomplishment, any new and complicated institutions, and therefore does not proceed upon any exaggerated conception of the efficacy of human policy. On the contrary, it requires only (like most of the other expedients proposed by this system) the gradual abolition of those arbitrary and unjust arrangements, by which the order of nature is disturbed.

Another mistaken idea concerning the œconomical system is, that it is founded entirely upon theory, and unsupported by facts. That this may be the case with respect to some of its doctrines, I shall not dispute: but, in general, it may be safely affirmed, that they rest on a broader basis of facts, than any other political speculations which have been yet offered to the world; for they are founded, not on a few examples collected from the small number of governments of which we possess an accurate knowledge, but on those laws of human nature, and those maxims of common sense, which are daily verified in the intercourse of private life.

Of those who have speculated on the subject of legislation, by far the greater part seem to have considered it as a science *sui generis*, the first principles of which can be obtained in no other way, than by an examination of the conduct of mankind in their political capacity. The Œconomists, on the contrary, have searched for the causes of national prosperity, and national improvement, in those arrangements, which our daily observations shew to be favourable to the prosperity and to the improvement of individuals. The former resemble those philosophers of antiquity, who, affirming, that the phenomena of the heavens are regulated by laws peculiar to themselves, discouraged every attempt to investigate their physical causes, which was founded upon facts collected from common experience. The latter have aimed at accomplishing a reformation in politics, similar to what Kepler and Newton accomplished in astronomy; and, by subjecting to that common sense, which guides mankind in their private concerns, those questions, of which none were supposed to be competent judges, but men initiated in the mysteries of government, have given a beginning to a science which has already extended very widely our political prospects; and which, in its progress, may probably afford an illustration, not less striking than that which physical astronomy exhibits, of the simplicity of those laws by which the universe is governed. When a political writer, in order to expose the folly of those commercial regulations, which aim at the encouragement of domestic industry by restraints on importation, appeals to the maxims upon which men act in private life; when he remarks, that the tailor does not attempt to make his own shoes, but buys them of the shoemaker, that the shoemaker does not attempt to make his own clothes, but employs a tailor; and when he concludes, that what is prudence in the conduct of every private family, can scarcely be folly in that of a great kingdom,* he may undoubtedly be said, in one sense, to indulge in theory, as he calls in question the utility of institutions which appear, from the fact, to be not incompatible with a certain degree of political prosperity. But, in another sense, and in a much more philosophical one, he may be said to oppose to the false theories of statesmen, the common sense of mankind, and those maxims of expediency, of which every man may verify the truth by his own daily observation.

There is yet another mistake, (of still greater consequence, perhaps, than any of those I have mentioned,) which has misled most of the opponents, and even some of the friends, of the œconomical system; an idea that it was meant to exhibit a political order, which is really attainable in the present state of Europe. So different from this were the views of its most enlightened advocates, that they have uniformly rested their only hopes of its gradual establishment in the world, on that influence in the conduct of human affairs, which philosophy may be expected gradually to acquire, in consequence of the progress of reason and civilization. To suppose that a period is ever to arrive, when it shall be realized in its full extent, would be the height of enthusiasm and absurdity, but it is surely neither enthusiasm nor absurdity to affirm, that governments are more or less perfect, in proportion to the greater or smaller number of individuals to whom they afford the means of cultivating their intellectual and moral powers, and whom they admit to live together on a liberal footing of equality;—or even to expect, that, in proportion to the progress of reason, governments will actually approach nearer and nearer to this description.

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* See Mr. Smith's profound and original "Inquiry into the Nature and Causes of the Wealth of Nations."

To delineate that state of political society to which governments may be expected to approach nearer and nearer as the triumphs of philosophy extend, was, I apprehend, the leading object of the earliest and most enlightened patrons of the œconomical system. It is a state of society, which they by no means intended to recommend to particular communities, as the most eligible they could adopt at present; but as an ideal order of things, to which they have a tendency of themselves to approach, and to which it ought to be the aim of the legislator to facilitate their progrèss. In the language of mathematicians, it forms a *limit* to the progressive improvement of the political order; and, in the mean time, it exhibits a standard of comparison, by which the excellence of particular institutions may be estimated.

According to the view which has now been given of the œconomical system, its principles appear highly favourable to the tranquillity of society; in as much as, by inspiring us with a confidence in the triumph which truth and liberty must infallibly gain in the end over errour and injustice, it has a tendency to discourage every plan of innovation which is to be supported by violence and bloodshed. And, accordingly, such has always been the language of those who were best acquainted with the views of its authors. "If "we attack oppressors before we have taught the oppressed," (says one of the ablest of its present supporters,*) "we shall risk "the loss of liberty, and rouse them to oppose the progress of rea-"son. History affords proofs of this truth. How often, in spite of the "efforts of the friends of freedom, has the event of a single battle "reduced nations to the slavery of ages!

"And what is the kind of liberty enjoyed by those nations, which "have recovered it by force of arms, and not by the influence of "philosophy? Have not most of them confounded the forms of re-"publicanism with the enjoyment of right, and the despotism of "numbers with liberty? How many laws, contrary to the rights "of nature, have dishonoured the code of every people which has "recovered its freedom, during those ages in which reason was still "in its infancy!"

"Why not profit by this fatal experience, and wisely wait the "progress of knowledge, in order to obtain freedom more effectual, "more substantial, and more peaceful? Why pursue it by blood "and inevitable confusion, and trust that to chance, which time "must certainly, and without bloodshed, bestow? A fortunate "struggle may, indeed, relieve us of many grievances under which

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* M. Condorcet.

"we labour at present, but if we wish to secure the perfection and the permanence of freedom, we must patiently wait the period, when men, emancipated from their prejudices, and guided by philosophy, shall be rendered worthy of liberty, by comprehending its claims."*

Nor is it the employment of violent and sanguinary means alone, in order to accomplish political innovations, that this enlightened and humane philosophy has a tendency to discourage. By extending our views to the whole plan of civil society, and shewing us the mutual relations and dependencies of its most distant parts, it cannot fail to check that indiscriminate zeal against established institutions, which arises from partial views of the social system; as well as to produce a certain degree of scepticism with respect to every change, the success of which is not insured by the prevailing ideas and manners of the age. Sanguine and inconsiderate projects of reformation are frequently the offspring of clear and argumentative and systematical understandings; but rarely of comprehensive minds. For checking them, indeed, nothing is so effectual as a general survey of the complicated structure of society. Even although such a survey should be superficial, provided it be conducted on an extensive scale, it is more useful, at least for this purpose, than the most minute and successful inquiries, which are circumscribed within a narrow circle. If it should teach us nothing else, it will at least satisfy us of the extreme difficulty of predicting, with confidence, the remote effects of new arrangements; and that the perfection of political wisdom consists not in incumbering the machine of government with new contrivances to obviate every partial inconvenience, but in removing gradually, and imperceptibly, the obstacles which disturb the order of nature, and (as Mr. Addison somewhere expresses it) "in grafting upon her institutions."

When the œconomical system, indeed, is first presented to the mind, and when we compare the perfection which it exhibits, with the actual state of human affairs, it is by no means unnatural, that it should suggest plans of reformation too violent and sudden to be practicable. A more complete acquaintance, however, with the subject, will effectually cure these first impressions, by pointing out to us the mischiefs to be apprehended from an injudicious combination of theoretical perfection with our established laws, prejudices, and manners. As the various unnatural modes and habits of living, to which the bodily constitution is gradually reconciled by a course of luxurious indulgencies, have such a tendency to correct each other's effects, as to render a partial return to a more simple regimen, a dangerous, and, sometimes, a fatal experiment; so it is possible, that many of our imperfect political institutions may be so accommodated to each other, that a partial execution of the most plausible and equitable plans of reformation might tend, in the first instance, to frustrate those important purposes which we are anxious to promote. Is it not possible, for example, that the influence which is founded on a respect for hereditary rank, may have its use in counteracting that aristocracy which arises from inequality of wealth, and which so many laws and prejudices conspire to support? That the former species of influence is rapidly declining of itself, in consequence of the progress which commerce and philosophy have already made, is sufficiently obvious; and, I think, it may reasonably be doubted, whether a well-wisher to mankind would be disposed to accelerate its destruction, till the true principles of political œconomy are completely understood and acknowledged by the world.

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* To some of my readers it may appear trifling to remark, that, in availing myself of an occasional coincidence of sentiment with a contemporary author, I would not be understood to become responsible for the consistency of his personal conduct with his philosophical principles, nor to subscribe to any one of his opinions, but those to which I have expressed my assent by incorporating them with my own composition.

[*Note to second Edition.*]

Various other examples might be produced, to illustrate the dangers to be apprehended from the partial influence of general principles in politics; or, in other words, from an exclusive attention to particular circumstances in the political order, without comprehensive views of the subject. It is only upon a limited mind, therefore, that such studies will produce a passion for violent innovations. In more comprehensive and enlightened understandings, their natural effect is caution and diffidence with respect to the issue of every experiment, of which we do not perceive distinctly all the remote consequences. Nor is this caution at all inconsistent with a firm confidence in the certainty of that triumph which truth and liberty must infallibly gain in the end over errour and injustice. On the contrary, it is a natural and obvious consequence of such a conviction; in as much as the same arguments on which this conviction is founded, prove to us, that the progress of mankind towards the perfection of the social order, must necessarily, in every case, be gradual, and that it must be diversified in the course it takes, according to the situations and characters of nations. To direct, and, as far as possible, to accelerate, this progress, ought to be the great aim of the enlightened statesman, and, indeed, of every man who wishes well to his species; but it is necessary for him always to remember, that considerable alterations in the established order are very seldom to be effected immediately and directly by political regulations; and that they are, in all cases, most successful and most permanent, when they are accomplished gradually by natural causes, freed from those restraints which had formerly checked their operation. In the governments, indeed, of modern Europe, it is much more necessary to abolish old institutions, than to introduce new ones; and if this reformation be kept steadily in view, and not pushed farther at any time than circumstances render expedient, or the ideas of the times recommend, the essential principles of a more perfect order of things will gradually establish themselves, without any convulsion.

According to this view of the subject, the speculation concerning the perfect order of society is to be regarded merely as a description of the ultimate objects at which the statesman ought to aim. The tranquillity of his administration, and the immediate success of his measures, depend on his good sense, and his practical skill. And his theoretical principles only enable him to direct his measures steadily and wisely to promote the improvement and happiness of mankind, and prevent him from being ever led astray from these important objects, by more limited views of temporary expedience.*

Before closing this disquisition, it may be proper for me to attempt to obviate a little more fully than I have done, an objection which has been frequently drawn from the past experience of mankind, against that supposition of their progressive improvement, on which all the foregoing reasonings proceed. How mournful are the vicissitudes which history exhibits to us, in the course of human affairs; and how little foundation do they afford to our sanguine prospects concerning futurity! If, in those parts of the earth which were formerly inhabited by barbarians, we now see the most splendid exertions of genius, and the happiest forms of civil policy, we behold others, which, in ancient times, were the seats of science, of civilization, and of liberty, at present immersed in superstition, and laid waste by despotism. After a short period of civil, of military, and of literary glory, the prospect has changed at once: the career of degeneracy has begun, and has proceeded till it could advance no farther; or some unforeseen calamity has occurred, which has obliterated, for a time, all memory of former improvements, and has condemned mankind to retrace, step by step, the same path by which their forefathers had risen to greatness. In a word; on such a retrospective view of human affairs, man appears to be the mere sport of fortune and of accident; or rather, he appears to be doomed, by the condition of his nature, to run alternately the career of improvement and of degeneracy; and to realize the beautiful but melancholy fable of Sisyphus, by an eternal renovation of hope and of disappointment.

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* The foregoing observations on the general aim of the Œconomical System refer solely (as must appear evident to those who have perused them with attention) to the doctrines it contains on the article of *Political Economy*. *The Theory of Government* which it inculcates, is of the most dangerous tendency; recommending, in strong and unqualified terms, an unmixed despotism; and reprobating all constitutional checks on the sovereign authority. Many English writers, indeed, with an almost incredible ignorance of the works which they have presumed to censure, have spoken of them, as if they encouraged political principles of a very different complexion; but the truth is, that the disciples of *Quesnai* (without a single exception) carried their zeal for the power of the monarch, and what they called the *Unity of Legislation*, to so extravagant a length, as to treat with contempt those mixed establishments which allow any share whatever of legislative influence to the representatives of the people. On the one hand, the evidence of this system appeared to its partisans so complete and irresistible, that they flattered themselves monarchs would soon see with an intuitive conviction the identity of their own interests with those of the nations they are called to govern; and, on the other hand, they contended, that it is only under the strong and steady government of a race of hereditary princes, undistracted by the prejudices and local interests which warp the deliberations of popular assemblies, that a gradual and systematical approach can be made to the perfection of law and policy. The very first of *Quesnai's* maxims states as a fundamental principle, that the sovereign authority, unrestrained by any constitutional checks or balances, should be lodged in the hands of a single person; and the same doctrine is maintained zealously by all his followers;—by none of them more explicitly than by *Mercier de la Riviere*, whose treatise on "the natural and essential order of political societies," might have been expected to attract some notice in this country, from the praise which Mr. Smith has bestowed on the perspicuity of his style, and the distinctness of his arrangement.

If some individuals who formerly professed an enthusiastic attachment to the doctrines of this sect, have, at a later period of their lives, distinguished themselves by an enthusiasm no less ardent in opposition to the principles advanced in their writings, the fact only affords an additional illustration of a truth verified by daily experience, that the most solid foundation for political consistency is a spirit of moderation, and that the most natural and easy of all transitions is from the violence and intolerance of one extreme to those of another. [*Note to second Edition.*]

In opposition to these discouraging views of the state and prospects of man, it may be remarked in general, that in the course of these latter ages, a variety of events have happened in the history of the world, which render the condition of the human race essentially different from what it ever was among the nations of antiquity; and which, of consequence, render all our reasonings concerning their future fortunes, in so far as they are founded merely on their past experience, unphilosophical and inconclusive. The alterations which have taken place in the art of war, in consequence of the invention of fire-arms, and of the modern science of fortification, have given to civilized nations a security against the irruptions of barbarians, which they never before possessed. The more extended, and the more constant intercourse, which the improvements in commerce and in the art of navigation have opened, among the distant quarters of the globe, cannot fail to operate in undermining local and national prejudices, and in imparting to the whole species the intellectual acquisitions of each particular community. The accumulated experience of ages has already taught the rulers of mankind, that the most fruitful and the most permanent sources of revenue are to be derived, not from conquered and tributary provinces, but from the internal prosperity and wealth of their own subjects:—and the same experience now begins to teach nations, that the increase of their own wealth, so far from depending on the poverty and depression of their neighbours, is intimately connected with their industry and opulence; and consequently, that those commercial jealousies, which have hitherto been so fertile a source of animosity among different states, are founded entirely on ignorance and prejudice. Among all the circumstances, however, which distinguish the present state of mankind from that of ancient nations, the invention of printing is by far the most important; and, indeed, this single event, independently of every other, is sufficient to change the whole course of human affairs.

The influence which printing is likely to have on the future history of the world, has not, I think, been hitherto examined by philosophers with the attention which the importance of the subject deserves. One reason for this may probably have been, that, as the invention has never been made but once, it has been considered rather as the effect of a fortunate accident, than as the result of those general causes on which the progress of society seems to depend. But it may be reasonably questioned, how far this idea be just. For, although it should be allowed, that the invention of printing was accidental, with respect to the individual who made it, it may, with truth, be considered as the natural result of a state of the world, when a number of great and contiguous nations are all engaged in the study of literature, in the pursuit of science, and in the practice of the arts; in so much, that I do not think it extravagant to affirm, that, if this invention had not been made by the particular person to whom it is ascribed, the same art, or some analogous art, answering a similar purpose, would have infallibly been invented by some other person, and at no very distant period. The art of printing, therefore, is intitled to be considered as a step in the natural history of man, no less than the art of writing; and they who are sceptical about the future progress of the race, merely in consequence of its past history, reason as unphilosophically, as a member of a savage tribe, who, deriving his own acquaintance with former times from oral tradition only, should affect to call in question the efficacy of written records, in accelerating the progress of knowledge and of civilization.

What will be the particular effects of this invention, (which has been hitherto much checked in its operation by the restraints on the liberty of the press in the greater part of Europe,) it is beyond the reach of human sagacity to conjecture, but, in general, we may venture to predict with confidence, that, in every country, it will gradually operate to widen the circle of science and civilization; to distribute more equally, among all the members of the community, the advantages of the political union; and to enlarge the basis of equitable governments, by increasing the number of those who understand their value, and are interested to defend them. The science of legislation, too, with all the other branches of knowledge which are connected with human improvement, may be expected to advance with rapidity; and, in proportion as the opinions and institutions of men approach to truth and to justice, they will be secured against those revolutions to which human affairs have always been hitherto subject. *Opinionum enim commenta delet dies, naturæ judicia confirmat.*

The revolutions incident to the democratical states of antiquity furnish no solid objection to the foregoing observations: for none of these states enjoyed the advantages, which modern times derive, from the diffusion and from the rapid circulation of knowledge. In these states, most of the revolutions which happened, arose from the struggles of demagogues, who employed the passions of the multitude in subserviency to their own interest and ambition; and to all of them, the ingenious and striking remark of Hobbes will be found applicable; that, "Democracy is nothing but an aristocracy "of orators, interrupted sometimes by the temporary monarchy of "a single orator." While this continued to be the case, democratical constitutions were, undoubtedly, the most unfavourable of any to the tranquillity of mankind; and the only way to preserve the order of society was, by skilfully balancing against each other, the prejudices and the separate interests of different orders of citizens. That such balances, however, will every day become less necessary for checking the turbulence of the democratical spirit in free governments, appears probable from this; that among the various advantages to be expected from the liberty of the press, one of the greatest is, the effect which it must necessarily have in diminishing the influence of popular eloquence, both by curing men of those prejudices upon which it operates, and by subjecting it to the irresistible controul of enlightened opinions. In the republican states of antiquity, the eloquence of demagogues was indeed a dangerous engine of faction, while it aspired to govern nations by its unlimited sway in directing popular councils. But now, when the effusions of the orator are, by means of the press, subjected to the immediate tribunal of an inquisitive age, the eloquence of legislative assemblies is forced to borrow its tone from the spirit of the times; and if it retain its ascendant in human affairs, it can only be, by lending its aid to the prevailing cause, and to the permanent interests of truth and of freedom.

Of the progress which may yet be made in the different branches of moral and political philosophy, we may form some idea, from what has already happened in physics, since the time that Lord Bacon united, in one useful direction, the labours of those who cultivate that science. At the period when he wrote, physics was certainly in a more hopeless state, than that of moral and political philosophy in the present age. A perpetual succession of chimerical theories had, till then, amused the world; and the prevailing opinion was, that the case would continue to be the same for ever. Why then should we despair of the competency of the human faculties to establish solid and permanent systems, upon other subjects, which are of still more serious importance? Physics, it is true, are free from many difficulties which obstruct our progress in moral and political inquiries; but, perhaps, this advantage may be more than counterbalanced by the tendency they have to engage a more universal, and a more earnest attention, in consequence of their coming home more immediately to our "business and our bosoms." When these sciences too begin to be prosecuted on a regular and systematical plan, their improvement will go on with an accelerated velocity; not only as the number of speculative minds will be every day increased by the diffusion of knowledge, but as an acquaintance with the just rules of inquiry will more and more place important discoveries within the reach of ordinary understandings. "Such rules," (says Lord Bacon) "do, in some sort, equal men's "wits, and leave no great advantage or pre-eminence to the per- "fect and excellent motions of the spirit. To draw a straight line, "or to describe a circle, by aim of hand only, there must be a great "difference between an unsteady and an unpractised hand, and a "steady and practised; but, to do it by a rule or compass, it is "much alike."

Nor must we omit to mention the value which the art of printing communicates to the most limited exertions of literary industry, by treasuring them up as materials for the future examination of more enlightened inquiries. In this respect the press bestows upon the sciences an advantage somewhat analogous to that which the mechanical arts derive from the division of labour. As in these arts, the exertions of an uninformed multitude are united by the comprehensive skill of the artist, in the accomplishment of effects astonishing by their magnitude, and by the complicated ingenuity they display, so, in the sciences, the observations and conjectures of obscure individuals on those subjects which are level to their capacities, and which fall under their own immediate notice, accumulate for a course of years, till at last, some philosopher arises, who combines these scattered materials, and exhibits, in his system, not merely the force of a single mind, but the intellectual power of the age in which he lives.

It is upon these last considerations, much more than on the efforts of original genius, that I would rest my hopes of the progress of the human race. What genius alone could accomplish in science, the world has already seen: and I am ready to subscribe to the opinion of those who think, that the splendour of its past exertions is not likely to be obscured by the fame of future philosophers. But the experiment yet remains to be tried, what lights may be thrown on the most important of all subjects, by the free discussions of inquisitive nations, unfettered by prejudice, and stimulated in their inquiries by every motive that can awaken whatever is either generous or selfish in human nature. How trifling are the effects which the bodily strength of an individual is able to produce, (however great may be his natural endowments,) when compared with those which have been accomplished by the conspiring force of an ordinary multitude? It was not the single arm of a Theseus, or a Hercules, but the hands of such men as ourselves, that, in ancient Egypt, raised those monuments of architecture, which remain from age to age, to attest the wonders of combined and of persevering industry, and, while they humble the importance of the individual, to exalt the dignity, and to animate the labours, of the species.

These views with respect to the probable improvement of the world, are so conducive to the comfort of those who entertain them, that even, although they were founded in delusion, a wise man would be disposed to cherish them. What should have induced some respectable writers to controvert them with so great an asperity of expression, it is not easy to conjecture, for whatever may be thought of their truth, their practical tendency is surely favourable to human happiness; nor can that temper of mind, which disposes a man to give them a welcome reception, be candidly suspected of designs hostile to the interests of humanity. One thing is certain, that the greatest of all obstacles to the improvement of the world, is that prevailing belief of its improbability, which damps the exertions of so many individuals; and that, in proportion as the contrary opinion becomes general, it realizes the event which it leads us to anticipate. Surely, if any thing can have a tendency to call forth in the public service the exertions of individuals, it must be an idea of the magnitude of that work in which they are conspiring, and a belief of the permanence of those benefits, which they confer on mankind by every attempt to inform and to enlighten them. As in ancient Rome, therefore, it was regarded as the mark of a good citizen, never to despair of the fortunes of the republic;—so the good citizen of the world, whatever may be the political aspect of his own times, will never despair of the fortunes of the human race, but will act upon the conviction, that prejudice, slavery, and corruption must gradually give way to truth, liberty, and virtue; and that, in the moral world, as well as in the material, the farther our observations extend, and the longer they are continued, the more we shall perceive of order and of benevolent design in the universe.

Nor is this change in the condition of Man in consequence of the progress of reason, by any means contrary to the general analogy of his natural history. In the infancy of the individual, his existence is preserved by instincts, which disappear afterwards, when they are no longer necessary. In the savage state of our species, there are instincts which seem to form a part of the human constitution, and of which no traces remain in those periods of society, in which their use is superseded by a more enlarged experience. Why then should we deny the probability of something similar to this, in the history of mankind considered in their political capacity? I have already had occasion to observe, that the governments which the world has hitherto seen, have seldom or never taken their rise from deep-laid schemes of human policy. In every state of society which has yet existed, the multitude has, in general, acted from the immediate impulse of passion, or from the pressure of their wants and necessities; and, therefore, what we commonly call the political order, is, at least in a great measure, the result of the passions and wants of man, combined with the circumstances of his situation, or, in other words, it is chiefly the result of the wisdom of nature. So beautifully, indeed, do these passions and circumstances act in subserviency to her designs, and so invariably have they been found, in the history of past ages, to conduct him in time to certain beneficial arrangements, that we can hardly bring ourselves to believe, that the end was not foreseen by those who were engaged in the pursuit. Even in those rude periods of society, when, like the lower animals, he follows blindly his instinctive principles of action, he is led by an invisible hand, and contributes his share to the execution of a plan, of the nature and advantages of which he has no conception. The operations of the bee, when it begins for the first time to form its cell, convey to us a striking image of the efforts of unenlightened Man, in conducting the operations of an infant government.

A great variety of prejudices might be mentioned, which are found to prevail universally among our species in certain periods of society, and which seem to be essentially necessary for maintaining its order, in ages when men are unable to comprehend the purposes for which governments are instituted. As society advances, these prejudices gradually lose their influence on the higher classes, and would probably soon disappear altogether, if it were not found expedient to prolong their existence, as a source of authority over the multitude. In an age, however, of universal and of unrestrained discussion, it is impossible that they can long maintain their empire; nor ought we to regret their decline, if the important ends to which they have been subservient in the past experience of mankind, are found to be accomplished by the growing light of philosophy. On this supposition, a history of human prejudices, as far as they have supplied the place of more enlarged political views, may, at some future period, furnish to the philosopher a subject of speculation, no less pleasing and instructive, than that beneficent wisdom of nature, which guides the operations of the lower animals, and which, even in our own species, takes upon itself the care of the individual in the infancy of human reason.

I have only to observe farther, that, in proportion as these prospects, with respect to the progress of reason, the diffusion of knowledge, and the consequent improvement of mankind, shall be realized, the political history of the world will be regulated by steady and uniform causes, and the philosopher will be enabled to form probable conjectures with respect to the future course of human affairs.

It is justly remarked by Mr. Hume, that "What depends on a "few persons is, in a great measure, to be ascribed to chance, or "secret and unknown causes: what arises from a great number, "may often be accounted for by determinate and known causes." "To judge by this rule," (he continues,) "the domestic and the "gradual revolutions of a state must be a more proper object of "reasoning and observation, than the foreign and the violent, "which are commonly produced by single persons, and are more "influenced by whim, folly, or caprice, than by general passions "and interests. The depression of the Lords, and rise of the Com- "mons, in England, after the statutes of alienation and the increase "of trade and industry, are more easily accounted for by general "principles, than the depression of the Spanish, and rise of the "French monarchy, after the death of Charles the Fifth. Had "Harry the Fourth, Cardinal Richlieu, and Louis the Fourteenth "been Spaniards; and Philip the Second, Third, and Fourth, and "Charles the Second, been Frenchmen; the history of these na- "tions had been entirely reversed."

From these principles, it would seem to be a necessary consequence, that, in proportion as the circumstances shall operate which I have been endeavouring to illustrate, the whole system of human affairs, including both the domestic order of society in particular states, and the relations which exist among different communities, in consequence of war and negotiation, will be subjected to the influence of causes which are "known and determinate." Those domestic affairs, which, according to Mr. Hume, are already proper subjects of reasoning and observation, in consequence of their dependence on general interests and passions, will become so, more and more, daily, as prejudices shall decline, and knowledge shall be diffused among the lower orders: while the relations among the different states, which have depended hitherto, in a great measure, on the "whim, folly and caprice" of single persons, will be gradually more and more regulated by the general interests of the individuals who compose them, and by the popular opinions of more enlightened times. Already, during the very short interval which has elapsed since the publication of Mr. Hume's writings, an astonishing change has taken place in Europe. The mysteries of courts have been laid open; the influence of secret negotiation on the relative situation of states has declined: and the studies of those men whose public spirit or ambition devotes them to the service of their country, have been diverted from the intrigues of cabinets, and the details of the diplomatic code, to the liberal and manly pursuits of political philosophy.

CHAPTER FIFTH.

OF THE ASSOCIATION OF IDEAS.

The subject on which I am now to enter, naturally divides itself into two Parts. The first relates to the influence of Association, in regulating the succession of our thoughts; the second, to its influence on the intellectual powers, and on the moral character, by the more intimate and indissoluble combinations which it leads us to form in infancy and in early youth. The two inquiries, indeed, run into each other; but it will contribute much to the order of our speculations, to keep the foregoing arrangement in view.

PART FIRST.

OF THE INFLUENCE OF ASSOCIATION IN REGULATING THE SUCCESSION OF OUR THOUGHTS.

SECTION I.

General Observations on this Part of our Constitution, and on the Language of Philosophers with respect to it.

That one thought is often suggested to the mind of another, and that the sight of an external object often recalls former occurrences, and revives former feelings, are facts which are perfectly familiar, even to those who are the least disposed to speculate concerning the principles of their nature. In passing along a road which we have formerly travelled in the company of a friend, the particulars of the conversation in which we were then engaged, are frequently suggested to us by the objects we meet with. In such a scene, we recollect that a particular subject was started; and, in passing the different houses, and plantations, and rivers, the arguments we were discussing when we last saw them, recur spontaneously to the memory. The connexion which is formed in the mind between the words of a language and the ideas they denote; the connexion which is formed between the different words of a discourse we have committed to memory; the connexion between the different notes of a piece of music in the mind of the musician, are all obvious instances of the same general law of our nature.

The influence of perceptible objects in reviving former thoughts and former feelings, is more particularly remarkable. After time has in some degree, reconciled us to the death of a friend, how wonderfully are we affected the first time we enter the house where he lived! Every thing we see, the apartment where he studied, the chair upon which he sat, recall to us the happiness we have enjoyed together; and we should feel it a sort of violation of that respect we owe to his memory, to engage in any light or indifferent discourse when such objects are before us. In the case, too, of those remarkable scenes which interest the curiosity, from the memorable persons or transactions which we have been accustomed to connect with them in the course of our studies, the fancy is more awakened by the actual perception of the scene itself, than by the mere conception or imagination of it. Hence the pleasure we enjoy in visiting classical ground, in beholding the retreats which inspired the genius of our favourite authors, or the fields which have been dignified by exertions of heroic virtue. How feeble are the emotions produced by the liveliest conception of modern Italy, to what the poet felt, when amidst the ruins of Rome,

"He drew th' inspiring breath of ancient arts,
" ———— And trod the sacred walks
" Where, at each step, imagination burns!"[*]

The well-known effect of a particular tune on Swiss regiments when at a distance from home, furnishes a very striking illustration of the peculiar power of a perception, or of an impression on the senses, to awaken associated thoughts and feelings; and numberless facts of a similar nature must have occurred to every person of moderate sensibility, in the course of his own experience.

" Whilst we were at dinner," (says Captain King,) " in this mise-
" rable hut, on the banks of the river Awatska; the guests of a

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[*] "Quacunque ingredimur," (says Cicero, speaking of Athens,) "in aliquam historiam vestigium ponimus."

"people with whose existence we had before been scarce acquainted, and at the extremity of the habitable globe; a solitary, half-worn pewter spoon, whose shape was familiar to us, attracted our attention, and, on examination, we found it stamped on the back with the word, *London.* I cannot pass over this circumstance in silence, out of gratitude for the many pleasant thoughts, the anxious hopes, and tender remembrances, it excited in us. Those who have experienced the effects that long absence, and extreme distance from their native country, produce on the mind, will readily conceive the pleasure such a trifling incident can give."

The difference between the effect of a perception and an idea, in awakening associated thoughts and feelings, is finely described in the introduction to the fifth book *De finibus.*

"We agreed," (says Cicero,) "that we should take our afternoon's walk in the academy, as at that time of the day it was a place where there was no resort of company. Accordingly, at the hour appointed, we went to Piso's. We passed the time in conversing on different matters during our short walk from the double gate, till we came to the academy, that justly celebrated spot; which, as we wished, we found a perfect solitude." "I know not," (said Piso,) "whether it be a natural feeling, or an illusion of the imagination founded on habit, that we are more powerfully affected by the sight of those places which have been much frequented by illustrious men, than when we either listen to the recital, or read the detail, of their great actions. At this moment I feel strongly that emotion which I speak of. I see before me the perfect form of Plato, who was wont to dispute in this very place: these gardens not only recall him to my memory, but present his very person to my senses. I fancy to myself, that here stood Speusippus; there, Xenocrates, and here, on this bench, sat his disciple Polemo. To me, our ancient senate-house seems peopled with the like visionary forms; for, often, when I enter it, the shades of Scipio, of Cato, and of Lælius; and, in particular, of my venerable grand-father, rise to my imagination. In short, such is the effect of local situation in recalling associated ideas to the mind, that it is not without reason, some philosophers have founded on this principle a species of artificial memory."

This influence of perceptible objects, in awakening associated thoughts and associated feelings, seems to arise, in a great measure, from their permanent operation as exciting or suggesting causes. When a train of thought takes its rise from an idea or conception, the first idea soon disappears, and a series of others succeeds, which are gradually less and less related to that with which the train commenced; but, in the case of perception, the exciting cause remains steadily before us, and all the thoughts and feelings which have any relation to it, crowd into the mind in rapid succession, strengthening each other's effects, and all conspiring in the same general impression.

I have already observed, that the connexions, which exist among our thoughts, have been long familiarly known to the vulgar, as well as to philosophers. It is, indeed, only of late, that we have been possessed of an appropriated phrase to express them; but that the general fact is not a recent discovery, may be inferred from many of the common maxims of prudence and of propriety, which have plainly been suggested by an attention to this part of our constitution. When we lay it down, for example, as a general rule, to avoid in conversation all expressions, and all topics of discourse, which have any relation, however remote, to ideas of an unpleasant nature, we plainly proceed on the supposition that there are certain connexions among our thoughts, which have an influence over the order of their succession. It is unnecessary to remark, how much of the comfort and good humour of social life depends on an attention to this consideration. Such attentions are more particularly essential in our intercourse with men of the world; for the commerce of society has a wonderful effect in increasing the quickness and the facility with which we associate all ideas which have any reference to life and manners;* and, of consequence, it must render the sensibility alive to many circumstances which, from the remoteness of their relation to the situation and history of the parties, would otherwise have passed unnoticed.

When an idea, however, is thus suggested by association, it produces a slighter impression, or, at least, it produces its impression more gradually, than if it were presented more directly and immediately to the mind. And hence, when we are under the necessity of communicating any disagreeable information to another, delicacy leads us, instead of mentioning the thing itself, to mention something else from which our meaning may be understood. In this manner we prepare our hearers for the unwelcome intelligence.

The distinction between gross and delicate flattery, is founded upon the same principle. As nothing is more offensive than flattery which is direct and pointed, praise is considered as happy and elegant, in proportion to the slightness of the associations by which it is conveyed.

To this tendency which one thought has to introduce another, philosophers have given the name of the *Association of Ideas;* and, as I would not wish, excepting in a case of necessity, to depart from common language, or to expose myself to the charge of delivering old doctrines in a new form, I shall continue to make use of the same expression. I am sensible, indeed, that the expression is by no means unexceptionable; and that, if it be used (as it frequently has been) to comprehend those laws by which the succession of all our thoughts and of all our mental operations is regulated, the word *idea* must be understood in a sense much more extensive than it is commonly employed in. It is very justly remarked by Dr. Reid, that "memory, judgment, reasoning, passions, affections, and purposes; in a word, every operation of the mind, excepting those of sense, is excited occasionally in the train of our thoughts: so that, if we make the train of our thoughts to be only a train of ideas, the word *idea* must be understood to denote all these operations." In continuing, therefore, to employ, upon this subject, that language, which has been consecrated by the practice of our best philosophical writers in England, I would not be understood to dispute the advantages which might be derived from the introduction of a new phrase, more precise and more applicable to the fact.

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* The superiority which the man of the world possesses over the recluse student, in his knowledge of mankind, is partly the result of this quickness and facility of association. Those trifling circumstances in conversation and behaviour, which, to the latter, convey only their most obvious and avowed meaning, lay open to the former many of the trains of thought which are connected with them, and frequently give him a distinct view of a character, on that very side where it is supposed to be most concealed from his observation.

The ingenious author whom I last quoted, seems to think that the *association of ideas* has no claim to be considered as an original principle or as an ultimate fact in our nature. "I believe," (says he,) "that the original principles of the mind, of which we can give no account, but that such is our constitution, are more in number than is commonly thought. But we ought not to multiply them without necessity. That trains of thinking, which, by frequent repetition, have become familiar, should spontaneously offer themselves to our fancy, seems to require no other original quality but the power of habit."

With this observation I cannot agree; because I think it more philosophical to resolve the power of habit into the association of ideas than to resolve the association of ideas into habit.

The word *habit*, in the sense in which it is commonly employed, expresses that facility which the mind acquires, in all its exertions, both animal and intellectual, in consequence of practice. We apply it to the dexterity of the workman: to the extemporary fluency of the orator; to the rapidity of the arithmetical accountant. That this facility is the effect of practice, we know from experience to be a fact: but it does not seem to be an ultimate fact, nor incapable of analysis.

In the Essay on Attention, I shewed that the effects of practice are produced partly on the body, and partly on the mind. The muscles which we employ in mechanical operations, become stronger, and become more obedient to the will. This is a fact, of which it is probable that philosophy will never be able to give any explanation.

But even in mechanical operations, the effects of practice are produced partly on the mind; and, as far as this is the case, they are resolvable in what philosophers call the *association of ideas*; or into that general fact, which Dr. Reid himself has stated, "that trains of thinking, which, by frequent repetition, have become familiar, spontaneously offer themselves to the mind." In the case of habits which are purely intellectual, the effects of practice resolve themselves completely into this principle: and it appears to me more precise and more satisfactory, to state the principle itself as a law of our constitution, than to slur it over under the concise appellation of *habit*, which we apply in common to mind and to body.

The tendency in the human mind to associate or connect its thoughts together, is sometimes called (but very improperly) the *imagination*. Between these two parts of our constitution, there is indeed a very intimate relation; and it is probably owing to this relation, that they have been so generally confounded under the same name. When the mind is occupied about absent objects of sense, (which, I believe, it is habitually in the great majority of mankind,) its train of thought is merely a series of conceptions; or, in common language, of imaginations.* In the case, too, of poetical imagination, it is the association of ideas that supplies the materials out of which its combinations are formed; and when such an imaginary combination is become familiar to the mind, it is the association of ideas that connects its different parts together, and unites them into one whole. The association of ideas, therefore, although perfectly distinct from the power of imagination, is immediately and essentially subservient to all its exertions.

The last observation seems to me to point out, also, the circumstance which has led the greater part of English writers, to use the words Imagination and Fancy as synonymous. It is obvious that a creative imagination, when a person possesses it so habitually that it may be regarded as forming one of the characteristics of his genius, implies a power of summoning up, at pleasure, a particular class of ideas, and of ideas related to each other in a particular manner; which power can be the result only of certain habits of association, which the individual has acquired. It is to this power of the mind, which is evidently a particular turn of thought, and not one of the common principles of our nature, that our best writers (so far as I am able to judge) refer, in general, when they make use of the word *fancy:* I say, in general; for in disquisitions of this sort, in which the best writers are seldom precise and steady in the employment of words, it is only to their prevailing practice that we can appeal as an authority. What the particular relations are, by which those ideas are connected, that are subservient to poetical imagination, I shall not inquire at present. I think they are chiefly those of resemblance and analogy. But whatever they may be, the power of summoning up at pleasure the ideas so related, as it is the ground work of poetical genius, is of sufficient importance in the human constitution to deserve an appropriate name; and, for this purpose, the word *fancy* would appear to be the most convenient that our language affords.

Dr. Reid has somewhere observed, that "the part of our constitution on which the association of ideas depends, was called, by the older English writers, *the fantasy or fancy*;" an use of the word, we may remark, which coincides, in many instances, with that which I propose to make of it. It differs from it only in this that these writers applied it to the association of ideas in general, whereas I restrict its application to that habit of association, which is subservient to poetical imagination.

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* Accordingly, Hobbes calls the train of thought in the mind, "Consequentia sive "series imaginationum." "Per seriem imaginationum intelligo successionem unius cogitationis ad aliam."—LEVIATHAN, cap. iii.

According to the explanation, which has now been given of the word, Fancy, the office of this power is to collect materials for the Imagination; and therefore the latter power presupposes the former, while the former does not necessarily suppose the latter. A man whose habits of association present to him, for illustrating or embellishing a subject, a number of resembling or of analogous ideas, we call a man of fancy; but for an effort of imagination, various other powers are necessary, particularly the powers of taste and of judgment; without which we can hope to produce nothing that will be a source of pleasure to others. It is the power of fancy which supplies the poet with metaphorical language, and with all the analogies which are the foundation of his illusions; but it is the power of imagination that creates the complex scenes he describes, and the fictitious characters he delineates. To fancy, we apply the epithets of rich or luxuriant; to imagination, those of beautiful or sublime.

SECTION II.

Of the Principles of Association among our Ideas.

THE facts which I stated in the former section, to illustrate the tendency of a perception, or of an idea, to suggest ideas related to it, are so obvious as to be matter of common remark. But the relations which connect all our thoughts together, and the laws which regulate their succession, were but little attended to before the publication of Mr. Hume's writings.

It is well known to those who are in the least conversant with the present state of metaphysical science, that this eminent writer has attempted to reduce all the principles of association among our ideas to three: Resemblance, Contiguity in time and place, and Cause and Effect. The attempt was great, and worthy of his genius; but it has been shewn by several writers since his time,* that his enumeration is not only incomplete, but that it is even indistinct so far as it goes.

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* See, in particular, Lord Kaimes' Elements of Criticism, and Dr. Gerard's Essay on Genius. See also Dr. Campbell's Philosophy of Rhetoric, vol. i. p. 197.

It is observed by Dr. Beattie, that something like an attempt to enumerate the laws of association is to be found in Aristotle; who, in speaking of Recollection, insinuates, with his usual brevity, that "the relations, by which we are led from one thought to another, in tracing out, or *hunting after*," (as he calls it,) "any particular thought which does not immediately occur, are chiefly three; Resemblance, Contrariety, and Contiguity."

See *Dissertations, Moral and Critical*, p. 9. Also p. 145.

The passage to which Dr. Beattie refers is as follows:

'Οταν ουν αναμιμνησκωμεθα, κινουμεθα των προτερων τινα κινησεων, ἑως αν κινηθωμεν, μεθ' ἡν εκεινη ειωθε. Διο και το εφεξης θηρευομεν νοησαντες απο του νυν, η αλλου τινος, και αφ' ὁμοιου, η εναντιου, η του συνεγγυς. Δια τουτο γινεται ἡ αναμνησις.

ARISTOT. *de Memor. et Reminisc.* vol i. p. 681. Edit. DU VAL.

It is not necessary for my present purpose, that I should enter into a critical examination of this part of Mr. Hume's system; or that I should attempt to specify those principles of association which he has omitted. Indeed, it does not seem to me, that the problem admits of a satisfactory solution; for there is no possible relation among the objects of our knowledge, which may not serve to connect them together in the mind; and, therefore, although one enumeration may be more comprehensive than another, a perfectly complete enumeration is scarcely to be expected.

Nor is it merely in consequence of the relations among things, that our notions of them are associated: they are frequently coupled together by means of relations among the words which denote them; such as a similarity of sound, or other circumstances still more trifling. The alliteration which is so common in poetry, and in proverbial sayings, seems to arise, partly at least from associations of ideas founded on the accidental circumstance of the two words which express them beginning with the same letter.

> "But thousands die, without or this or that:
> Die; and endow a College, or a Cat."
>
> Pope's Ep. to Lord Bathurst.
>
> "Ward tried, on Puppies, and the Poor, his drop."
>
> Id. Imitat. of Horace.
>
> "Puffs, powders, patches; Bibles, billets-doux."
>
> Rape of the Lock.

This indeed pleases only on slight occasions, when it may be supposed that the mind is in some degree playful, and under the influence of those principles of association which commonly take place when we are careless and disengaged. Every person must be offended with the second line of the following couplet, which forms part of a very sublime description of the Divine power:

> "Breathes in our soul, informs our mortal part,
> As full, as perfect, in a Hair as Heart."
>
> Essay on Man, Ep. i.

To these observations, it may be added, that things which have no known relation to each other, are often associated, in consequence of their producing similar effects on the mind. Some of the finest poetical allusions are founded on this principle; and accordingly, if the reader is not possessed of sensibility congenial to that of the poet, he will be apt to overlook their meaning, or to censure them as absurd. To such a critic, it would not be easy to vindicate the beauty of the following stanza, in an Ode addressed to a lady by the author of *the Seasons*.

> Oh thou, whose tender, serious eye
> Expressive speaks the soul I love;
> The gentle azure of the sky,
> The pensive shadows of the grove.

I hav [illegible] ght
to take [illegible] tract
of asso [illegible] and,
them, [illegible] stitution
as far [illegible] The
phers. [illegible] power of
perfec [illegible]
other [illegible]
attent [illegible]
and [illegible]
those [illegible]
ferent [illegible]
when [illegible]
are [illegible] of
are [illegible] the
and [illegible] ed,
thou [illegible] the
part [illegible] with

It [illegible] d in
high [illegible] ob-
any i [illegible] ught,
see a [illegible] te in
rigor [illegible]
sugges [illegible] oxical,
to him [illegible] supposes
read, [illegible] casion.
effect; [illegible] avour
ingly c [illegible] ly be
ed by an [illegible] mind.

How a [illegible]
Thomson' [illegible] cir-
digression, [illegible] an ob-
and insensib [illegible] but can-
naturally lea [illegible] these
began [illegible] proceed.
[illegible] which
[illegible] or,
[illegible] we must
[illegible] ances as-
[illegible] properly
[illegible] exception
[illegible] of the
[illegible] the beginning
[illegible] perfectly re-
[illegible] two or three
[illegible] sentence, in order to
[illegible] with them in

> Alt [illegible]
> Exalt [illegible]
> Delight [illegible]
> Sits at the [illegible]
> Th' exclu [illegible]
> His harden'd [illegible]
> Without him [illegible]
> Nor to th' Au [illegible]
> Those full, [illegible]
> That waving rou [illegible]

In Goldsmith's Traveller, [illegible]
summate skill; and yet, how [illegible]
which would be suited to a phi [illegible]
society in the different parts of [illegible]

the memory. In this instance, it is evident, that the circumstances we desire to remember, are not recalled to the mind in immediate consequence of an exertion of volition, but are suggested by some other circumstances with which they are connected, independently of our will, by the laws of our constitution.

Notwithstanding, however, the immediate dependence of the train of our thoughts on the laws of association, it must not be imagined that the will possesses no influence over it. This influence, indeed, is not exercised directly and immediately, as we are apt to suppose, on a superficial view of the subject; but it is, nevertheless, very extensive in its effects; and the different degrees in which it is possessed by different individuals, constitute some of the most striking inequalities among men, in point of intellectual capacity.

Of the powers which the mind possesses over the train of its thoughts, the most obvious is its power of singling out any one of them at pleasure; of detaining it; and of making it a particular object of attention. By doing so, we not only stop the succession that would otherwise take place, but, in consequence of our bringing to view the less obvious relations among our ideas, we frequently divert the current of our thoughts into a new channel. If, for example, when I am indolent and inactive, the name of Sir Isaac Newton accidentally occur to me, it will perhaps suggest, one after another, the names of some other eminent mathematicians and astronomers, or of some of his illustrious contemporaries and friends: and a number of them may pass in review before me, without engaging my curiosity in any considerable degree. In a different state of mind, the name of Newton will lead my thoughts to the principal incidents of his life, and the more striking features of his character: or, if my mind be ardent and vigorous, will lead my attention to the sublime discoveries he made, and gradually engage me in some philosophical investigation. To every object, there are others which bear obvious and striking relations; and others, also, whose relations to it does not readily occur to us, unless we dwell upon it for some time, and place it before us in different points of view.

But the principal power we possess over the train of our ideas, is founded on the influence which our habits of thinking have on the laws of Association; an influence which is so great, that we may often form a pretty shrewd judgment concerning a man's prevailing turn of thought, from the transitions he makes in conversa[illegible] or in writing. It is well known, too, that by means of habit, [illegible]lar associating principle may be strengthened to such a de[illegible] give us a command of all the di[illegible] ideas in our mind, [illegible] certain relation to each [illegible] that wh[illegible]y one [illegible] to us, we have almo[illegible] sug- [illegible] confidence in h[illegible]ker [illegible] without prem[illegible] [illegible] with a liv[illegible] can [illegible] try, in which the principal recommendations are ease of thought and expression. Hence, too, the facility with which they contract or lose habits, and accommodate their minds to new situations; and, I may add, the disposition they have to that species of superstition which is founded on accidental combinations of circumstances. The influence which this facility of association has on the power of Taste, shall be afterwards considered.

SECTION III.

Of the Power which the Mind has over the Train of its Thoughts.

By means of the Association of Ideas, a constant current of thoughts, if I may use the expression, is made to pass through the mind while we are awake. Sometimes the current is interrupted, and the thoughts diverted into a new channel, in consequence of the ideas suggested by other men, or of the objects of perception with which we are surrounded. So completely, however, is the mind in this particular subjected to physical laws, that it has been justly observed,* we cannot, by an effort of our will, call up any one thought; and that the train of our ideas depends on causes which operate in a manner inexplicable by us.

This observation, although it has been censured as paradoxical, is almost self-evident; for, to call up a particular thought, supposes it to be already in the mind. As I shall have frequent occasion, however, to refer to the observation afterwards, I shall endeavour to obviate the only objection, which, I think, can reasonably be urged against it; and which is founded on that operation of the mind, which is commonly called recollection or intentional memory.

It is evident, that before we attempt to recollect the particular circumstances of any event, that event in general must have been an object of our attention. We remember the outlines of the story, but cannot at first give a complete account of it. If we wish to recall these circumstances, there are only two ways in which we can proceed. We must either form different suppositions, and then consider which of these tallies best with the other circumstances of the event; or, by revolving in our mind the circumstances we remember, we must endeavour to excite the recollection of the other circumstances associated with them. The first of these processes is, properly speaking, an inference of reason, and plainly furnishes no exception to the doctrine already delivered. We have an instance of the other mode of recollection, when we are at a loss for the beginning of a sentence in reciting a composition that we do not perfectly remember; in which case we naturally repeat over, two or three times, the concluding words of the preceding sentence, in order to call up the other words which used to be connected with them in the memory. In this instance, it is evident, that the circumstances we desire to remember, are not recalled to the mind in immediate consequence of an exertion of volition, but are suggested by some other circumstances with which they are connected, independently of our will, by the laws of our constitution.

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* By Lord Kaimes, and others.

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To how great a degree this part of our constitution may be influenced by habit, appears from facts which are familiar to every one. A man who has an ambition to become a punster, seldom or never fails in the attainment of his object; that is, he seldom or never fails in acquiring a power which other men have not, of summoning up, on a particular occasion, a number of words different from each other in meaning, and resembling each other, more or less, in sound. I am inclined to think that even genuine wit is a habit acquired in a similar way; and that, although some individuals may, from natural constitution, be more fitted than others to acquire this habit, it is founded in every case on a peculiarly strong association among certain classes of our ideas, which gives the person who posseses it, a command over those ideas which is denied to ordinary men. But there is no instance in which the effect of habits of association is more remarkable, than in those men who possess a facility of rhyming. That a man should be able to express his thoughts perspicuously and elegantly, under the restraints which rhyme imposes, would appear to be incredible, if we did not know it to be fact. Such a power implies a wonderful command both of ideas and of expressions, and yet daily experience shews, that it may be gained with very little practice. Pope tells us with respect to himself, that he could express himself not only more concisely, but more easily, in rhyme than in prose.*

Nor is it only in these trifling accomplishments that we may trace the influence of habits of association. In every instance of invention, either in the fine arts, in the mechanical arts, or in the sciences, there is some new idea, or some new combination of ideas, brought to light by the inventor. This, undoubtedly, may often happen in a way which he is unable to explain; that is his invention may be suggested to him by some lucky thought, the origin of which he is unable to trace. But when a man possesses an habitual fertility of invention in any particular art or science, and can rely with confidence on his inventive powers, whenever he is called upon to exert them, he must have acquired, by previous habits of study, a command over certain classes of his ideas, which enables him, at pleasure, to bring them under his review. The illustration of these subjects may throw light on some processes of the mind, which are not in general well understood: and I shall, accordingly, in the following Section, offer a few hints with respect to those habits of association which are the foundation of wit; of the power of rhyming; of poetical fancy; and of invention in matters of science.

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* "When habit is once gained, nothing is so easy as practice. Cicero writes, that Antipater the Sidonian could pour forth hexameters extempore; and that, whenever he chose to versify, words followed him of course. We may add to Antipater. the ancient rhapsodists of the Greeks, and the modern improvisatori of the Italians."

Harris's *Phil. Inq*. 109, 110.

SECTION IV.

Illustrations of the Doctrine stated in the preceding Section.

I.

OF WIT.

According to Locke, Wit consists "in the assemblage of ideas; "and putting those together with quickness and variety, wherein "can be found any resemblance or congruity."* I would add to this definition, (rather by way of explanation than amendment,) that Wit implies a power of calling up at pleasure the ideas which it combines: and I am inclined to believe, that the entertainment which it gives to the hearer, is founded, in a considerable degree, on his surprise at the command which the man of wit has acquired over a part of the constitution, which is so little subject to the will.

That the effect of wit depends partly, at least, on the circumstance now mentioned, appears evidently from this, that we are more pleased with a *bon mot*, which occurs in conversation, than with one in print; and that we never fail to receive disgust from wit, when we suspect it to be premeditated. The pleasure, too, we receive from wit, is heightened, when the original idea is started by one person, and the related idea by another. Dr. Campbell has remarked, that "a witty repartee is infinitely more pleasing, than a witty "attack; and that an allusion will appear excellent when thrown "out extempore in conversation, which would be deemed execrable "in print." In all these cases, the wit considered absolutely is the same. The relations which are discovered between the compared ideas are equally new: and yet, as soon as we suspect that the wit was premeditated, the pleasure we receive from it is infinitely diminished. Instances indeed may be mentioned, in which we are pleased with contemplating an unexpected relation between ideas, without any reference to the habits of association in the mind of the person who discovered it. A *bon mot* produced at the game of cross purposes, would not fail to create amusement; but in such cases, our pleasure seems chiefly to arise from the surprise we feel, at so extraordinary a coincidence between a question and an answer, coming from persons who had no direct communication with each other.

Of the effect added to wit by the promptitude with which its combinations are formed, Fuller appears to have had a very just idea, from what he has recorded of the social hours of our two great English Dramatists. "Jonson's parts were not so ready to run of "themselves, as able to answer the spur; so that it may be truly "said of him, that he had an *elaborate wit*, wrought out by his own "industry.—Many were the wit-combats between him and Shakspeare, which two I behold like a Spanish great galleon, and an

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* Essay on Human Understanding, book ii. chap. 11.

" English man of war. Jonson (like the former) was built far higher
" er in learning; solid, but slow in his performances. Shakspeare,
" with the English man of war, lesser in bulk, but lighter in sailing,
" could turn with all tides, tack about and take advantage of all
" winds, by the quickness of his wit and invention."*

I before observed, that the pleasure we receive from wit is increased, when the two ideas, between which the relation is discovered, are suggested by different persons. In the case of a *bon mot* occurring in conversation, the reason of this is abundantly obvious; because, when the related ideas are suggested by different persons, we have a proof that the wit was not premeditated. But even in a written composition, we are much more delighted when the subject was furnished to the author by another person, than when he chooses the topic on which he is to display his wit. How much would the pleasure we receive from the *Key to the Lock* be diminished, if we suspected that the author had the key in view when he wrote that poem; and that he introduced some expressions, in order to furnish a subject for the wit of the commentator? How totally would it destroy the pleasure we receive from a parody on a poem, if we suspected that both were productions of the same author? The truth seems to be, that when both the related ideas are suggested by the same person, we have not a very satisfactory proof of any thing uncommon in the intellectual habits of the author. We may suspect that both ideas occurred to him at the same time; and we know, that in the dullest and most phlegmatic minds, such extraordinary associations will sometimes take place. But when the subject of the wit is furnished by one person, and the wit suggested by another, we have a proof, not only that the author's mind abounds with such singular associations, but that he has his wit perfectly at command.

As an additional confirmation of these observations, we may remark, that the more an author is limited by his subject, the more we are pleased with his wit. And, therefore, the effect of wit does not arise solely from the unexpected relations which it presents to the mind, but arises, in part, from the surprise it excites at those intellectual habits which gave it birth. It is evident, that the more the author is circumscribed in the choice of his materials, the greater must be the command which he has acquired over those associating principles on which wit depends, and of consequence, according to the foregoing doctrine, the greater must be the surprise and the pleasure which his wit produces. In Addison's celebrated verses to Sir Godfrey Kneller, on his picture of George the First, in which he compares the painter to Phidias, and the subjects of his pencil to the Grecian Deities, the range of the poet's wit was necessarily confined within very narrow bounds; and what principally delights us in that performance is, the surprising ease and felicity with which he runs the parallel between the English history and the Greek mythology. Of all the allusions which the following passage contains, there is not one, taken singly, of very extraordinary merit; and yet the effect of the whole is uncommonly great, from the singular power of combination, which so long and so difficult an exertion discovers.

---

* History of the Worthies of England. London, 1662.

> " Wise Phidias thus, his skill to prove,
> " Through many a god advanc'd to Jove,
> " And taught the polish'd rocks to shine
> " With airs and lineaments divine,
> " Till Greece amaz'd and half afraid,
> " Th' assembled Deities survey'd.
> " Great Pan, who wont to chase the fair,
> " And lov'd the spreading oak, was there ;
> " Old Saturn, too, with up-cast eyes,
> " Beheld his abdicated skies ;
> " And mighty Mars for war renown'd,
> " In adamantine armour frown'd ;
> " By him the childless Goddess rose,
> " Minerva, studious to compose
> " Her twisted threads ; the web she strung,
> " And o'er a loom of marble hung ;
> " Thetis, the troubled ocean's queen,
> " Match'd with a mortal next was seen,
> " Reclining on a funeral urn,
> " Her short-liv'd darling son to mourn ;
> " The last was he, whose thunder slew
> " The Titan race, a rebel crew,
> " That from a hundred hills ally'd,
> " In impious league their King defy'd."

According to the view which I have given of the nature of Wit, the pleasure we derive from that assemblage of ideas which it presents, is greatly heightened and enlivened by our surprise at the command displayed over a part of the constitution, which, in our own case, we find to be so little subject to the will. We consider Wit as a sort of feat or trick of intellectual dexterity, analogous in some respects, to the extraordinary performances of jugglers and rope-dancers; and, in both cases, the pleasure we receive from the exhibition, is explicable *in part*, (I, by no means, say *entirely*) on the same principles.

If these remarks be just, it seems to follow as a consequence, that those men who are most deficient in the power of prompt combination, will be most poignantly affected by it, when exerted at the will of another: and therefore, the charge of jealousy and envy brought against rival Wits, when disposed to look grave at each other's jests, may perhaps be obviated in a way less injurious to their character.

The same remarks suggest a limitation, or rather an explanation, of an assertion of Lord Chesterfield's, that " genuine wit never made " any man laugh since the creation of the world." The observation, I believe, to be just, if by genuine wit, we mean wit wholly divested of every mixture of humour: and if by laughter we mean, that convulsive and noisy agitation which is excited by the ludicrous. —But there is unquestionably a *smile* appropriated to the flashes of wit; a smile of surprize and wonder; not altogether unlike the effect produced on the mind and the countenance, by a feat of legerdemain, when executed with uncommon success.

II.

OF RHYME.

The pleasure we receive from rhyme seems also to arise, partly, from our surprise at the command which the Poet must have acquired over the train of his ideas, in order to be able to express himself with elegance, and the appearance of ease, under the restraint which rhyme imposes. In witty or in humorous performances, this surprize serves to enliven that which the wit or the humour produces, and renders its effects more sensible. How flat do the liveliest and most ludicrous thoughts appear in blank verse! And how wonderfully is the wit of Pope heightened, by the easy and happy rhymes in which it is expressed!

It must not, however, be imagined, either in the case of wit or of rhyme, that the pleasure arises solely from our surprise at the uncommon habits of association which the author discovers. In the former case, there must be presented to the mind, an unexpected analogy or relation between different ideas: and perhaps other circumstances must concur to render the wit perfect.

If the combination has no other merit than that of bringing together two ideas which never met before, we may be surprised at its oddity, but we do not consider it as a proof of wit. On the contrary, the want of any analogy or relation between the combined ideas, leads us to suspect, that the one did not suggest the other, in consequence of any habits of association; but that the two were brought together by study, or by mere accident. All that I affirm is, that when the analogy or relation is pleasing in itself, our pleasure is heightened by our surprise at the author's habits of association when compared with our own. In the case of Rhyme, too, there is undoubtedly a certain degree of pleasure arising from the recurrence of the same sound. We frequently observe children amuse themselves with repeating over single words, which rhyme together: and the lower people, who derive little pleasure from poetry, excepting in so far as it affects the ear, are so pleased with the echo of the rhymes, that when they read verses where it is not perfect, they are apt to supply the Poet's defects, by violating the common rules of pronunciation. This pleasure, however, is heightened by our admiration of the miraculous powers which the poet must have acquired over the train of his ideas, and over all the various modes of expression which the language affords, in order to convey instruction and entertainment, without transgressing the established laws of regular versification. In some of the lower kinds of poetry, for example, in acrostics, and in the lines which are adapted to *bouts rimés*, the merit lies entirely in this command of thought and expression; or in other words, in a command of ideas founded on extraordinary habits of association. Even some authors of a superior class occasionally shew an inclination to display their knack at rhyming, by introducing, at the end of the first line of a couplet, some word to which the language hardly affords a corresponding sound. Swift, in his more trifling pieces, abounds with instances of this; and in Hudibras, when the author uses his double and triple rhymes, many couplets have no merit whatever, but what arises from difficulty of execution.

The pleasure we receive from rhyme, in serious compositions, arises from a combination of different circumstances which my present subject does not lead me to investigate particularly.* I am persuaded, however, that it arises, in part, from our surprise at the Poet's habits of association, which enable him to convey his thoughts with ease and beauty, notwithstanding the narrow limits within which his choice of expression is confined. One proof of this is, that if there appear any mark of constraint, either in the ideas or in the expression, our pleasure is proportionally diminished. The thoughts must seem to suggest each other, and the rhymes to be only an accidental circumstance. The same remark may be made on the measure of the verse. When in its greatest perfection, it does not appear to be the result of labour, but to be dictated by nature, or prompted by inspiration. In Pope's best verses, the idea is expressed with as little inversion of style, and with as much conciseness, precision, and propriety, as the other could have attained, had he been writing prose: without any apparent exertion on his part, the words seem spontaneously to arrange themselves in the most musical numbers.

"While still a child, nor yet a fool to fame,
"I lisp'd in numbers, for the numbers came."

This facility of versification, it is true, may be, and probably is, in most cases, only apparent: and it is reasonable to think, that in the most perfect poetical productions, not only the choice of words, but the choice of ideas, is influenced by the rhymes.—In a prose composition, the author holds on in a direct course, according to the plan he has previously formed; but in a poem, the rhymes which occur to him are perpetually diverting him to the right hand or to the left, by suggesting ideas which do not naturally rise out of his subject. This, I presume, is Butler's meaning in the following couplet:

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* In Elegiac poetry, the recurrence of the same sound, and the uniformity in the structure of the versification, which this necessarily occasions, are peculiarly suited to the inactivity of the mind, and to the slow and equable succession of its ideas, when under the influence of tender or melancholy passions; and, accordingly, in such cases, even the Latin poets, though the genius of their language be very ill fitted for compositions in rhyme, occasionally indulge themselves in something very nearly approaching to it.

"Memnona si mater, mater ploravit Achillem,
"Et tangunt magnas tristia fata Deas;
"Flebilis indignos Elegeia solve capillos,
"Ah nimis ex vero nunc tibi nomen erit."

Many other instances of the same kind might be produced from the Elegiac verses of Ovid and Tibullus.

> "Rhymes the rudder are of verses
> "With which, like ships, they steer their courses."

But although this may be the case in fact, the Poet must employ all his art to conceal it: in so much that, if he finds himself under the necessity to introduce, on account of the rhymes, a superfluous idea, or an awkward expression, he must place it in the first line of the couplet, and not in the second; for the reader, naturally presuming that the lines were composed in the order in which the author arranges them, is more apt to suspect the second line to be accommodated to the first, than the first to the second. And this slight artifice is, in general, sufficient to impose on that degree of attention with which poetry is read. Who can doubt that, in the following lines, Pope wrote the first for the sake of the second?

> "A wit's a feather, and a chief a rod;
> "An honest man's the noblest work of God."

Were the first of these lines, or a line equally unmeaning, placed last, the couplet would have appeared execrable to a person of the most moderate taste.

It affords a strong confirmation of the foregoing observations, that the Poets of some nations have delighted in the practice of alliteration, as well as of rhyme, and have even considered it as an essential circumstance in versification. Dr. Beattie observes, that "some "ancient English poems are more distinguished by alliteration, than "by any other poetical contrivance. In the works of Langland, even "when no regard is had to rhyme, and but little to a rude sort of "anapæstic measure, it seems to have been a rule, that three words, "at least, of each line should begin with the same letter." A late author informs us, that, in the Icelandic poetry, alliteration is considered as a circumstance no less essential than rhyme.* He mentions also several other restraints, which must add wonderfully to the difficulty of versification; and which appear to us to be perfectly arbitrary and capricious. If that really be the case, the whole pleasure of the reader or hearer arises from his surprise at the facility of the Poet's composition under these complicated restraints; that is, from his surprise at the command which the Poet has acquired over his thoughts and expressions. In our rhyme, I acknowledge, that the coincidence of sound is agreeable in itself; and only affirm, that the pleasure which the ear receives from it, is heightened by the other consideration.

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* "The Icelandic poetry requires two things; viz. words with the same initial letters, and words of the same sound. It was divided into stanzas, each of which consisted of four couplets; and each of these couplets was again composed of two hemistichs, of which every one contained six syllables; and it was not allowed to augment this number, except in cases of the greatest necessity." See VAN TROIL'S Letters on Iceland. p. 208.

III.

OF POETICAL FANCY.

There is another habit of association, which, in some men, is very remarkable; that which is the foundation of Poetical Fancy: a talent which agrees with Wit in some circumstances, but which differs from it essentially in others.

The pleasure we receive from Wit, agrees in one particular with the pleasure which arises from poetical allusions; that in both cases we are pleased with contemplating an analogy between two different subjects. But they differ in this, that the man of Wit has no other aim than to combine analogous ideas;* whereas no allusion can, with propriety, have a place in serious poetry, unless it either illustrate or adorn the principal subject. If it has both these recommendations, the allusion is perfect. If it has neither, as is often the case with the allusions of Cowley and of Young, the Fancy of the Poet degenerates into Wit.

If the observations be well-founded, they suggest a rule with respect to poetical allusions, which has not always been sufficiently attended to. It frequently happens, that two subjects bear an analogy to each other in more respects than one; and where such can be found, they undoubtedly furnish the most favourable of all occasions for the display of Wit.—But in serious poetry, I am inclined to think, that however striking these analogies may be, and although each of them might, with propriety, be made the foundation of a separate allusion, it is improper, in the course of the same allusion, to include more than one of them; as, by doing so, an author discovers an affectation of Wit, or a desire of tracing analogies, instead of illustrating or adorning the subject of his composition.

I formerly defined Fancy to be a power of associating ideas according to the relations of resemblance and analogy. This definition will probably be thought too general; and to approach too near to that given of Wit. In order to discover the necessary limitations, we shall consider what the circumstances are, which please us in poetical allusions. As these allusions are suggested by Fancy, and are the most striking instances in which it displays itself, the received rules of Critics with respect to them may throw some light on the mental power which gives them birth.

1. An allusion pleases, by illustrating a subject comparatively obscure. Hence, I apprehend, it will be found, that allusions from the intellectual world to the material, are more pleasing, than from the material world to the intellectual. Mason, in his Ode to Me-

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* I speak here of pure and unmixed wit, and not of wit, blended, as it is most commonly, with some degree of humour.

mory, compares the influence of that faculty over our ideas, to the authority of a general over his troops:

> ——" thou, whose sway
> " The throng'd ideal hosts obey;
> " Who bidst their ranks now vanish, now appear,
> " Flame in the van, or darken in the rear."

Would the allusion have been equally pleasing, from a general marshalling his soldiers, to Memory and the succession of ideas?

The effect of a literal and spiritless translation of a work of genius, has been compared to that of the figures which we see, when we look at the wrong side of a beautiful piece of tapestry. The allusion is ingenious and happy: but the pleasure which we receive from it arises, not merely from the analogy which it presents to us, but from the illustration which it affords of the author's idea. No one, surely, in speaking of a piece of tapestry, would think of comparing the difference between its sides, to that between an original composition and a literal translation!

Cicero, and after him Mr. Locke, in illustrating the difficulty of attending to the subjects of our consciousness, have compared the Mind to the Eye, which sees every object around it, but is invisible to itself. To have compared the Eye, in this respect, to the Mind, would have been absurd.

Mr. Pope's comparison of the progress of youthful curiosity, in the pursuits of science, to that of a traveller among the Alps, has been much, and justly, admired. How would the beauty of the allusion have been diminished, if the Alps had furnished the original subject, and not the illustration!

But although this rule holds in general, I acknowledge, that instances may be produced, from our most celebrated poetical performances, of allusions from material objects, both to the intellectual and the moral worlds. These, however, are comparatively few in number, and are not to be found in descriptive or in didactic works, but in compositions written under the influence of some particular passion, or which are meant to express some peculiarity in the mind of the author. Thus, a melancholy man, who has met with many misfortunes in life, will be apt moralize on every physical event, and every appearance of nature; because his attention dwells more habitually on human life and conduct, than on the material objects around him. This is the case with the banished Duke, in Shakspeare's *As you like it*, who, in the language of that Poet,

> " Finds tongues in trees, books in the running brooks,
> " Sermons in stones, and good in every thing."

But this is plainly a distempered state of the mind; and the allusions please, not so much by the analogies they present, as by the picture they give of the character of the person to whom they have occurred.

2. An allusion pleases, by presenting a new and beautiful image to the mind. The analogy, or the resemblance between this image and the principal subject, is agreeable of itself, and is indeed necessary to furnish an apology for the transition which the writer makes; but the pleasure is wonderfully heightened, when the new image thus presented is a beautiful one. The following allusion, in one of Mr. Home's tragedies, appears to me to unite almost every excellence:

——"Hope and fear, alternate, sway'd his breast;
"Like light and shade upon a waving field,
"Coursing each other, when the flying clouds
"Now hide, and now reveal, the Sun."

Here the analogy is remarkably perfect; not only between light and hope, and between darkness and fear but between the rapid succession of light and shade, and the momentary influences of these opposite emotions: and, at the same time, the new image which is presented to us, is one of the most beautiful and striking in nature.

The foregoing observations suggest a reason why the principal stores of Fancy are commonly supposed to be borrowed from the material world. Wit has a more extensive province, and delights to make new combinations, whatever be the nature of the compared ideas: but the favourite excursions of Fancy, are from intellectual and moral subjects to the appearances with which our senses are conversant. The truth is, that such allusions please more than any others in poetry. According to this limited idea of Fancy, it presupposes, where it is possessed in an eminent degree, an extensive observation of natural objects, and a mind susceptible of strong impressions from them. It is thus only that a stock of images can be acquired: and that these images will be ready to present themselves, whenever any analogous subject occurs. And hence probably it is, that poetical genius is almost always united with an exquisite sensibility to the beauties of nature.

Before leaving the subject of fancy, it may not be improper to remark, that its two qualities are, liveliness and luxuriancy. The word *lively* refers to the quickness of the association. The word *rich* or *luxuriant* to the variety of associated ideas.

IV.

OF INVENTION IN THE ARTS AND SCIENCES.

To these powers of Wit and Fancy, that of Invention in the Arts and Sciences has a striking resemblance. Like them, it implies a command over certain classes of ideas, which in ordinary men are not equally subject to the will: and like them, too, it is the result of acquired habits, and not the original gift of nature.

Of the process of the mind in scientific invention, I propose afterwards to treat fully under the article of Reasoning; and I shall therefore confine myself at present to a few detached remarks upon some views of the subject which are suggested by the foregoing inquiries.

Before we proceed, it may be proper to take notice of the distinction between Invention and Discovery. The object of the former, as has been frequently remarked, is to produce something which had no existence before; that of the latter, to bring to light something which did exist, but which was concealed from common observation. Thus we say, Otto Guerricke invented the air-pump; Sanctorius invented the thermometer; Newton and Gregory invented the reflecting telescope: Galileo discovered the solar spots; and Harvey discovered the circulation of the blood. It appears, therefore, that improvements in the Arts are properly called *inventions;* and that facts brought to light by means of observation, are properly called *discoveries.*

Agreeable to this analogy is the use which we make of these words, when we apply them to subjects purely intellectual. As truth is eternal and immutable, and has no dependence on our belief or disbelief of it, a person who brings to light a truth formerly unknown, is said to make a discovery. A person, on the other hand, who contrives a new method of discovering truth, is called an inventor. Pythagoras, we say, discovered the forty-seventh proposition of Euclid's first book; Newton discovered the binomial theorem: but he invented the method of prime and ultimate ratios; and he invented the method of fluxions.

In general every advancement in knowledge is considered as a discovery; every contrivance by which we produce an effect, or accomplish an end, is considered as an invention. Discoveries in science, therefore, unless they are made by accident, imply the exercise of invention; and, accordingly, the word *invention* is commonly used to express originality of genius in the Sciences, as well as in the Arts. It is in this general sense that I employ it in the following observations.

It was before remarked, that in every instance of invention, there is some new idea, or some new combination of ideas, which is brought to light by the inventor; and that, although this may sometimes happen in a way which he is unable to explain, yet when a man possesses an habitual fertility of invention in any particular Art or Science, and can rely, with confidence, on his inventive powers, whenever he is called upon to exert them; he must have acquired, by previous habits of study, a command over those classes of his ideas, which are subservient to the particular effort that he wishes to make. In what manner this command is acquired, it is not possible, perhaps, to explain completely; but it appears to me to be chiefly in the two following ways. In the first place, by his habits of speculation, he may have arranged his knowledge in such a manner as may render it easy for him to combine, at pleasure, all the various ideas in his mind, which have any relation to the subject about which he is occupied : or, secondly, he may have learned by experience certain general rules, by means of which he can direct the train of his thoughts into those channels, in which the ideas he is in quest of may be most likely to occur to him.

I. The former of these observations I shall not stop to illustrate particularly at present, as the same subject will occur afterwards, under the article of Memory. It is sufficient for my purpose, in this chapter, to remark, that as habits of speculation have a tendency to classify our ideas, by leading us to refer particular facts and particular truths to general principles; and as it is from an approximation and comparison of related ideas, that new discoveries in most instances result; the knowledge of the philosopher, even supposing that it is not more extensive, is arranged in a manner much more favourable to invention, than in a mind unaccustomed to system.

How much invention depends on a proper combination of the materials of our knowledge, appears from the resources which occur to men of the lowest degree of ingenuity, when they are pressed by any alarming difficulty and danger, and from the unexpected exertions made by very ordinary characters, when called to situations which rouse their latent powers. In such cases, I take for granted, that necessity operates in producing invention, chiefly by concentrating the attention of the mind to one set of ideas, by leading us to view these in every light, and to combine them variously with each other. As the same idea may be connected with an infinite variety of others by different relations, it may, according to circumstances, at one time, suggest one of these ideas, and, at another time, a different one. When we dwell long on the same idea, we obtain all the others to which it is any way related, and thus are furnished with materials on which our powers of judgment and reasoning may be employed. The effect of the division of labour in multiplying mechanical contrivances, is to be explained partly on the same principle. It limits the attention to a particular subject, and familiarizes to the mind all the possible combinations of ideas which have any relation to it.

These observations suggest a remarkable difference between Invention and Wit. The former depends, in most instances, on a combination of those ideas, which are connected by the less obvious principles of association; and it may be called forth in almost any mind by the pressure of external circumstances. The ideas which must be combined, in order to produce the latter, are chiefly such as are associated by those slighter connexions which take place when the mind is careless and disengaged. "If you have real wit," says Lord Chesterfield, "it will flow spontaneously, and you need "not aim at it; for in that case, the rule of the gospel is reversed; "and it will prove, seek and you shall not find." Agreeably to this observation, wit is promoted by a certain degree of intoxication, which prevents the exercise of that attention which is necessary for invention in matters of Science. Hence too it is, that those who have the reputation of Wits, are commonly men confident in their own powers, who allow the train of their ideas to follow in a great measure its natural course, and hazard, in company, every thing, good or bad, that occurs to them. Men of modesty and taste seldom attempt wit in a promiscuous society, or if they are forced to make such an exertion, they are seldom successful. Such men, however, in the circle of their friends, to whom they can unbosom themselves without reserve, are frequently the most amusing and the most interesting of companions; as the vivacity of their wit is tempered by a correct judgment, and refined manners, and as its effect is heightened by that sensibility and delicacy, with which we so rarely find it accompanied in the common intercourse of life.

When a man of wit makes an exertion to distinguish himself, his sallies are commonly too far fetched to please. He brings his mind into a state approaching to that of the inventor, and becomes rather ingenious than witty. This is often the case with the writers whom Johnson distinguishes by the name of the Metaphysical Poets.

Those powers of invention, which necessity occasionally calls forth in uncultivated minds, some individuals possess habitually. The related ideas which, in the case of the former, are brought together by the slow efforts of attention and recollection, present themselves to the latter, in consequence of a more systematical arrangement of their knowledge. The instantaneousness with which such remote combinations are effected, sometimes appear so wonderful, that we are apt to ascribe it to something like inspiration; but it must be remembered, that when any subject strongly and habitually occupies the thoughts, it gives us an interest in the observation of the most trivial circumstance which we suspect to have any relation to it, however distant; and by thus rendering the common objects and occurrences which the accidents of life present to us, subservient to one particular employment of the intellectual powers, establishes in the memory a connexion between our favourite pursuit, and all the materials with which experience and reflection have supplied us for the farther prosecution of it.

II. I observed, in the second place, that invention may be facilitated by general rules, which enable the inventor to direct the train of his thoughts into particular channels. These rules (to ascertain which ought to be one principal object of the logician) will afterwards fall under my consideration, when I come to examine those intellectual processes which are subservient to the discovery of truth. At present, I shall confine myself to a few general remarks; in stating which I have no other aim, than to shew to how great a degree invention depends on cultivation and habit, even in those sciences in which it is generally supposed that every thing depends on natural genius.

When we consider the geometrical discoveries of the ancients, in the form in which they are exhibited in the greater part of the works which have survived to our times, it is seldom possible for us to trace the steps by which they were led to their conclusions: and, indeed, the objects of this science are so unlike those of all others, that it is not unnatural for a person when he enters on the study, to be dazzled by its novelty, and to form an exaggerated conception of the genius of those men who first brought to light such a variety of truths, so profound and so remote from the ordinary course of our speculations. We find, however, that even at the time when the ancient analysis was unknown to the moderns, such mathematicians as had attended to the progress of the mind in the discovery of truth, concluded *a priori*, that the discoveries of the Greek geometers did not, at first, occur to them in the order in which they are stated in their writings. The prevailing opinion was, that they had been possessed of some secret method of investigation, which they carefully concealed from the world; and that they published the result of their labours in such a form, as they thought would be most likely to excite the admiration of their readers. "O quam bene "foret," says *Petrus Nonius*, "si qui in scientiis mathematicis scrip- "serint authores, scripta reliquissent inventa sua eadem methodo, et "per eosdem discursus, quibus ipsi in ea primum inciderunt; et non, "ut in mechanica loquitur Aristoteles de artificibus, qui nobis foris "ostendunt suas quas fecerint machinas, sed artificium abscondunt, ut "magis appareant admirabiles. Est utique inventio in arte qualibet "diversa multum a traditione: neque putandum est plurimas Eucli- "dis et Archimedis propositiones fuisse ab illis ea via inventas qua "nobis illi ipsas tradiderunt."* The revival of the ancient analysis by some late mathematicians in this country, has in part, justified these remarks, by shewing to how great a degree the inventive powers of the Greek geometers were aided by that method of investigation; and by exhibiting some striking specimens of address in the practical application of it.

The solution of problems, indeed, it may be said, is but one mode in which mathematical invention may be displayed. The discovery of new truths is what we chiefly admire in an original genius; and the method of analysis gives us no satisfaction with respect to the process by which they are obtained.

To remove this difficulty completely, by explaining all the various ways in which new theorems may be brought to light, would lead to inquiries foreign to this work. In order, however, to render the process of the mind, on such occasions, a little less mysterious than it is commonly supposed to be, it may be proper to remark, that the most copious source of discoveries is the investigation of problems; which seldom fails (even although we should not succeed in the attainment of the object which we have in view) to exhibit to us some relations formerly unobserved among the quantities which are under consideration. Of so great importance is it to concentrate the attention to a particular subject, and to check that wandering and dissipated habit of thought, which, in the case of most persons, renders their speculations barren of any profit either to themselves or to others. Many theorems, too, have been suggested by analogy; many have been investigated from truths formerly known, by altering or by generalizing the hypothesis; and many have been obtained by a species of induction. An illustration of these various processes of the mind would not only lead to new and curious remarks, but would contribute to diminish that blind admiration of original genius, which is one of the chief obstacles to the improvement of science.

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* See some other passages to the same purpose, quoted from different writers, by Dr. Simson, in the preface to his Restoration of the Loci Plani of Apollonius Pergaeus, Glasg. 1749.

The history of natural philosophy, before and after the time of Lord Bacon, affords another very striking proof, how much the powers of invention and discovery may be assisted by the study of method: and in all the sciences, without exception, whoever employs his genius with a regular and habitual success, plainly shews, that it is by means of general rules that his inquiries are conducted. Of these rules, there may be many which the inventor never stated to himself in words; and, perhaps, he may even be unconscious of the assistance which he derives from them; but their influence on his genius appears unquestionably from the uniformity with which it proceeds; and in proportion as they can be ascertained by his own speculations, or collected by the logician from an examination of his researches, similar powers of invention will be placed within the reach of other men, who apply themselves to the same study.

The following remarks, which a truly philosophical artist has applied to painting, may be extended with some trifling alterations, to all the different employments of our intellectual powers.

" What we now call genius begins, not where rules, abstractedly " taken, end; but where known, vulgar, and trite rules have no " longer any place.—It must of necessity be, that works of genius, " as well as every other effect, as it must have its cause, must like" wise have its rules; it cannot be by chance, that excellencies are " produced with any constancy, or any certainty, for this is not the " nature of chance; but the rules by which men of extraordinary " parts, and such as are called men of genius, work, are either such " as they discover by their own peculiar observation, or of such a " nice texture as not easily to admit handling or expressing in words.

" Unsubstantial, however, as these rules may seem, and difficult " as it may be to convey them in writing, they are still seen and felt " in the mind of the artist; and he works from them with as much " certainty, as if they were embodied, as I may say, upon paper. It " is true, these refined principles cannot be always made palpable, " like the more gross rules of Art; yet it does not follow, but that " the mind may be put in such a train, that it shall perceive, by a " kind of scientific sense, that propriety, which words can but very " feebly suggest."*

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* Discourses by Sir Joshua Reynolds.

SECTION V.

Application of the Principles stated in the foregoing Sections of this Chapter, to explain the Phenomena of Dreaming.

With respect to the Phenomena of Dreaming, three different questions may be proposed. First; What is the state of the *mind* in sleep? or, in other words, what faculties then continue to operate, and what faculties are then suspended? Secondly; how far do our dreams appear to be influenced by our bodily sensations; and in what respects do they vary, according to the different conditions of the body in health, and in sickness? Thirdly; what is the change which sleep produces on those parts of the *body*, with which our mental operations are more immediately connected; and how does this change operate, in diversifying, so remarkably, the phenomena which our minds then exhibit, from those of which we are conscious in our waking hours? Of these three questions, the first belongs to the philosophy of the Human Mind; and it is to this question that the following inquiry is almost entirely confined. The second is more particularly interesting to the Medical inquirer, and does not properly fall under the plan of this work. The third seems to me to relate to a subject, which is placed beyond the reach of the human faculties.

It will be granted, that, if we could ascertain the state of the mind in sleep, so as to be able to resolve the various phenomena of dreaming into a smaller number of general principles; and still more, if we could resolve them into one general fact, we should be advanced a very important step in our inquiries upon this subject; even although we should find it impossible to shew, in what manner this change in the state of the mind results from the change which sleep produces in the state of the body. Such a step would at least gratify, to a certain extent, that disposition of our nature which prompts us to ascend from particular facts to general laws, and which is the foundation of all our philosophical researches; and, in the present instance, I am inclined to think, that it carries us as far as our imperfect faculties enable us to proceed.

In conducting this inquiry with respect to the state of the mind in sleep, it seems reasonable to expect, that some light may be obtained from an examination of the circumstances which accelerate or retard its approach; for when we are disposed to rest, it is natural to imagine, that the state of the mind approaches to its state in sleep, more nearly, than when we feel ourselves alive and active, and capable of applying all our various faculties to their proper purposes.

In general, it may be remarked, that the approach of sleep is accelerated by every circumstance which diminishes or suspends the exercise of the mental powers, and is retarded by every thing which has a contrary tendency. When we wish for sleep, we naturally endeavour to withhold, as much as possible, all the active exertions of the mind, by disengaging our attention from every interesting subject of thought. When we are disposed to keep awake, we naturally fix our attention on some subject which is calculated to afford employment to our intellectual powers, or to rouse and exercise the active principles of our nature.

It is well known, that there is a particular class of sounds which compose us to sleep. The hum of bees; the murmur of a fountain; the reading of an uninteresting discourse, have this tendency in a remarkable degree. If we examine this class of sounds, we shall find that it consists wholly of such as are fitted to withdraw the attention of the mind from its own thoughts, and are, at the same time, not sufficiently interesting to engage its attention to themselves.

It is also matter of common observation, that children and persons of little reflection, who are chiefly occupied about sensible objects, and whose mental activity is, in a great measure, suspended, as soon as their perceptive powers are unemployed, find it extremely difficult to continue awake, when they are deprived of their usual engagements. The same thing has been remarked of savages, whose time, like that of the lower animals, is almost completely divided between sleep and their bodily exertions.*

From a consideration of these facts, it seems reasonable to conclude, that in sleep those operations of the mind are suspended, which depend on our volition; for if it be certain, that before we fall asleep, we must withhold, as much as we are able, the exercise of all our different powers, it is scarcely to be imagined, that, as soon as sleep commences, these powers should again begin to be exerted. The more probable conclusion is, that when we are desirous to procure sleep, we bring both mind and body, as nearly as we can, into that state in which they are to continue after sleep commences. The difference, therefore, between the state of the mind when we are inviting sleep, and when we are actually asleep, is this; that in the former case, although its active exertions be suspended, we can renew them, if we please. In the other case, the will loses its influence over all our powers both of mind and body, in consequence of some physical alteration in the system, which we shall never, probably, be able to explain.

In order to illustrate this conclusion a little farther, it may be proper to remark, that if the suspension of our voluntary operations in sleep be admitted as a fact, there are only two suppositions which can be formed concerning its cause. The one is, that the power of volition is suspended; the other, that the will loses its influence over those faculties of the mind, and those members of the body, which, during our waking hours, are subjected to its authority. If it can be shewn, then, that the former supposition is not agreeable to fact, the truth of the latter seems to follow as a necessary consequence.

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* "The existence of the Negro slaves in America appears to participate more of sensation than of reflexion. To this must be ascribed, their disposition to sleep when abstracted from their diversions, and unemployed in their labour. An animal whose body is at rest, and who does not reflect, must be disposed to sleep of course."—*Notes on Virginia, by Mr.* JEFFERSON, p. 255.

1. That the power of volition is not suspended during sleep, appears from the efforts which we are conscious of making while in that situation. We dream, for example, that we are in danger, and we attempt to call out for assistance. The attempt, indeed, is, in general, unsuccessful, and the sounds which we emit are feeble and indistinct; but this only confirms, or, rather, is a necessary consequence of the supposition, that, in sleep, the connexion between the will and our voluntary operations, is disturbed or interrupted. The continuance of the power of volition is demonstrated by the effort, however ineffectual.

In like manner, in the course of an alarming dream, we are sometimes conscious of making an exertion to save ourselves by flight from an apprehended danger, but in spite of all our efforts, we continue in bed. In such cases, we commonly dream, that we are attempting to escape, and are prevented by some external obstacle; but the fact seems to be, that the body is, at that time, not subject to the will. During the disturbed rest which we sometimes have when the body is indisposed, the mind appears to retain some power over it; but as, even in these cases, the motions which are made, consist rather of a general agitation of the whole system, than of the regular exertion of a particular member of it, with a view to produce a certain effect, it is reasonable to conclude, that, in perfectly sound sleep, the mind, although it retains the power of volition, retains no influence whatever over the bodily organs.

In that particular condition of the system, which is known by the name of *incubus*, we are conscious of a total want of power over the body: and, I believe, the common opinion is, that it is this want of power which distinguishes the *incubus* from all the other modifications of sleep. But the more probable supposition seems to be, that every species of sleep is accompanied with a suspension of the faculty of voluntary motion; and that the *incubus* has nothing peculiar in it but this, that the uneasy sensations which are produced by the accidental posture of the body, and which we find it impossible to remove by our own efforts, render us distinctly conscious of our incapacity to move. One thing is certain, that the instant of our awaking, and of our recovering the command of our bodily organs, is one and the same.

2. The same conclusion is confirmed by a different view of the subject. It is probable, as was already observed, that when we are anxious to procure sleep, the state into which we naturally bring the mind, approaches to its state after sleep commences. Now it is manifest, that the means which nature directs us to employ on such occasions, is not to suspend the power of volition, but to suspend the exertion of those powers whose exercise depends on volition. If it were necessary that volition should be suspended before we fall asleep, it would be impossible for us, by our own efforts, to hasten the moment of rest. The very supposition of such efforts is absurd, for it implies a continued will to suspend the acts of the will.

According to the foregoing doctrine with respect to the state of the mind in sleep, the effect which is produced on our mental operations, is strikingly analogous to that which is produced on our bodily powers. From the observations which have been already made, it is manifest, that in sleep, the body is, in a very inconsiderable degree, if at all, subject to our command. The vital and involuntary motions, however, suffer no interruption, but go on as when we are awake, in consequence of the operation of some cause unknown to us. In like manner, it would appear, that those operations of the mind which depend on our volition are suspended, while certain other operations are, at least, occasionally, carried on. This analogy naturally suggests the idea, that all our mental operations, which are independent of our will, may continue during sleep; and that the phenomena of dreaming may, perhaps, be produced by these, diversified in their apparent effects, in consequence of the suspension of our voluntary powers.

If the appearances which the mind exhibits during sleep, are found to be explicable on this general principle, it will possess all the evidence which the nature of the subject admits of.

It was formerly shewn, that the train of thought in the mind does not depend *immediately* on our will, but is regulated by certain general laws of association. At the same time, it appeared, that among the various subjects which thus spontaneously present themselves to our notice, we have the power of singling out any one that we choose to consider, and of making it a particular object of attention; and that by doing so, we not only can stop the train that would otherwise have succeeded, but frequently can divert the current of our thoughts into a new channel. It also appeared, that we have a power (which may be much improved by exercise) of recalling past occurrences to the memory, by a voluntary effort of recollection.

The *indirect* influence which the mind thus possesses over the train of its thoughts is so great, that during the whole time we are awake, excepting in those cases in which we fall into what is called a reverie, and suffer our thoughts to follow their natural course, the order of their succession is always regulated more or less by the will. The will, indeed, in regulating the train of thought, can operate only (as I have already shewed) by availing itself of the established laws of association; but still it has the power of rendering this train very different from what it would have been, if these laws had taken place without its interference.

From these principles, combined with the general fact which I have endeavoured to establish, with respect to the state of the mind in sleep, two obvious consequences follow: First, That when we are in this situation, the succession of our thoughts, in so far as it depends on the laws of association, may be carried on by the operation of the same unknown causes by which it is produced while we are awake; and, Secondly, that the order of our thoughts, in these two states of the mind, must be very different; in as much as, in the one, it depends solely on the laws of association, and in the other, on these laws, combined with our own voluntary exertions.

In order to ascertain how far these conclusions are agreeable to truth, it is necessary to compare them with the known phenomena of dreaming. For which purpose, I shall endeavour to shew, First, That the succession of our thoughts in sleep is regulated by the same general laws of association, to which it is subjected while we are awake; and Secondly, That the circumstances which discriminate dreaming from our waking thoughts, are such as must necessarily arise from the suspension of the influence of the will.

I. That the succession of our thoughts in sleep, is regulated by the same general laws of association, which influence the mind while we are awake, appears from the following considerations.

1. Our dreams are frequently suggested to us by bodily sensations: and with these, it is well known, from what we experience while awake, that particular ideas are frequently very strongly associated. I have been told by a friend, that having occasion, in consequence of an indisposition, to apply a bottle of hot water to his feet when he went to bed, he dreamed that he was making a journey to the top of Mount Ætna, and that he found the heat of the ground almost insupportable. Another person, having a blister applied to his head, dreamed that he was scalped by a party of Indians. I believe every one who is in the habit of dreaming, will recollect instances, in his own case, of a similar nature.

2. Our dreams are influenced by the prevailing temper of the mind; and vary, in their complexion, according as our habitual disposition, at the time, inclines us to cheerfulness or to melancholy. Not that this observation holds without exception; but it holds so generally, as must convince us, that the state of our spirits has some effect on our dreams, as well as on our waking thoughts. Indeed, in the latter case, no less than in the former, this effect may be counteracted, or modified, by various other circumstances.

After having made a narrow escape from any alarming danger, we are apt to awake, in the course of our sleep, with sudden startings, imagining that we are drowning, or on the brink of a precipice. A severe misfortune, which has affected the mind deeply, influences our dreams in a similar way, and suggests to us a variety of adventures, analogous, in some measure, to that event from which our distress arises. Such, according to Virgil, were the dreams of the forsaken Dido.

> " ——— Agit ipse furentem,
> " In somnis ferus Æneas; semperque relinqui,
> " Sola sibi; semper longam incomitata videtur,
> " Ire viam, et Tyrios desertâ quaerere terrâ."

3. Our dreams are influenced by our prevailing habits of association, while awake.

In a former part of this work, I considered the extent of that power which the mind may acquire over the train of its thoughts;

and I observed, that those intellectual diversities among men, which we commonly refer to peculiarities of genius, are, at least in a great measure, resolvable into differences in their habits of association. One man possesses a rich and beautiful fancy, which is at all times obedient to his will. Another possesses a quickness of recollection, which enables him, at a moment's warning, to bring together all the results of his past experience, and of his past reflections, which can be of use for illustrating any proposed subject. A third can, without effort, collect his attention to the most abstract questions in philosophy, can perceive, at a glance, the shortest and the most effectual process for arriving at the truth, and can banish from his mind every extraneous idea, which fancy or casual association may suggest, to distract his thoughts, or to mislead his judgment. A fourth unites all these powers in a capacity of perceiving truth with an almost intuitive rapidity, and in an eloquence which enables him to command, at pleasure, whatever his memory and his fancy can supply, to illustrate and to adorn it. The occasional exercise which such men make of their powers, may undoubtedly be said, in one sense, to be unpremeditated or unstudied; but they all indicate previous *habits* of meditation or study, as unquestionably, as the dexterity of the expert accountant, or the rapid execution of the professional musician.

From what has been said, it is evident, that a train of thought which, in one man, would require a painful effort of study, may, in another, be almost spontaneous; nor is it to be doubted, that the reveries of studious men, even when they allow, as much as they can, their thoughts to follow their own course, are more or less connected together by those principles of association, which their favourite pursuits tend more particularly to strengthen.

The influence of the same habits may be traced distinctly in sleep. There are probably few mathematicians, who have not dreamed of an interesting problem, and who have not even fancied that they were prosecuting the investigation of it with much success. They whose ambition leads them to the study of eloquence, are frequently conscious, during sleep, of a renewal of their daily occupations; and sometimes feel themselves possessed of a fluency of speech, which they never experienced before. The Poet, in his dreams, is transported into Elysium, and leaves the vulgar and unsatisfactory enjoyments of humanity, to dwell in those regions of enchantment and rapture, which have been created by the divine imaginations of Virgil and of Tasso.

> " And hither Morpheus sent his kindest dreams,
> " Raising a world of gayer tinct and grace;
> " O'er which were shadowy cast Elysian gleams,
> " That play'd, in waving lights, from place to place.
> " And shed a roseate smile on Nature's face.
> " Not Titan's pencil e'er could so array,
> " So fleece with clouds the pure etherial space;
> " Nor could it e'er such melting forms display,
> " As loose on flowery beds all languishingly lay.

" No, fair illusions ! artful phantoms, no !
" My muse will not attempt your fairy land :
" She has no colours, that like your's can glow ;
" To catch your vivid scenes, too gross her hand."*

As a farther proof that the succession of our thoughts in dreaming is influenced by our prevailing habits of association, it may be remarked, that the scenes and occurrences which most frequently present themselves to the mind while we are asleep, are the scenes and occurrences of childhood and early youth. The facility of association is then much greater than in more advanced years; and although, during the day, the memory of the events thus associated, may be banished by the objects and pursuits which press upon our senses, it retains a more permanent hold of the mind than any of our subsequent acquisitions; and, like the knowledge which we possess of our mother tongue, is, as it were, interwoven and incorporated with all its most essential habits. Accordingly, in old men, whose thoughts are, in a great measure, disengaged from the world, the transactions of their middle age, which once seemed so important, are often obliterated; while the mind dwells, as in a dream, on the sports and the companions of their infancy.

I shall only observe farther, on this head, that in our dreams, as well as when awake, we occasionally make use of words as an instrument of thought. Such dreams, however, do not affect the mind with such emotions of pleasure and of pain, as those in which the imagination is occupied with particular objects of sense. The effect of philosophical studies, in habituating the mind to the almost constant employment of this instrument, and of consequence, its effect in weakening the imagination, was formerly remarked. If I am not mistaken, the influence of these circumstances may also be traced in the history of our dreams; which, in youth, commonly involve, in a much greater degree, the exercise of imagination, and affect the mind with much more powerful emotions, than when we begin to employ our maturer faculties in more general and abstract speculations.

From these different observations, we are authorized to conclude, that the same laws of association which regulate the train of our thoughts, while we are awake, continue to operate during sleep. I now proceed to consider, how far the circumstances which discriminate dreaming from our waking thoughts, correspond with those which might be expected to result from the suspension of the influence of the will.

1. If the influence of the will be suspended during sleep, all our voluntary operations, such as recollection, reasoning, &c. must also be suspended.

That this really is the case, the extravagance and inconsistency of our dreams are sufficient proofs. We frequently confound together times and places the most remote from each other; and, in the course of the same dream, conceive the same person as existing in different parts of the world. Sometimes we imagine ourselves conversing with a dead friend, without remembering the circumstances of his death, although perhaps it happened but a few days before, and affected us deeply. All this proves clearly, that the subjects which then occupy our thoughts, are such as present themselves to the mind spontaneously; and that we have no power of employing our reason in comparing together the different parts of our dreams, or even of exerting an act of recollection, in order to ascertain how far they are consistent and possible.

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* Castle of Indolence.

The processes of reasoning, in which we sometimes fancy ourselves to be engaged during sleep, furnish no exception to the foregoing observation; for although every such process, the first time we form it, implies volition; and, in particular, implies a recollection of the premises, till we arrive at the conclusion; yet when a number of truths have been often presented to us as necessarily connected with each other, this series may afterwards pass through the mind, according to the laws of association, without any more activity on our part, than in those trains of thought which are the most loose and incoherent. Nor is this mere theory. I may venture to appeal to the consciousness of every man accustomed to dream, whether his reasonings during sleep do not seem to be carried on without any exertion of his will, and with a degree of facility, of which he was never conscious while awake. Mr. Addison, in one of his Spectators, has made this observation; and his testimony, in the present instance, is of the greater weight, that he had no particular theory on the subject to support. "There is not," (says he,) "a more painful action of the mind than invention, yet "in dreams, it works with that ease and activity, that we are not "sensible when the faculty is employed. For instance, I believe "every one, some time or other, dreams that he is reading papers, "books, or letters; in which case the invention prompts so readily, "that the mind is imposed on, and mistakes its own suggestions for "the composition of another."*

2. If the influence of the will during sleep be suspended, the mind will remain as passive, while its thoughts change from one subject to another, as it does during our waking hours, while different perceptible objects are presented to our senses.

Of this passive state of the mind in our dreams, it is unnecessary to multiply proofs; as it has always been considered as one of the most extraordinary circumstances with which they are accompanied. If our dreams, as well as our waking thoughts, were subject to the will, is it not natural to conclude, that, in the one case, as well as in the other, we would endeavour to banish, as much as we could, every idea which had a tendency to disturb us; and detain those only which we found to be agreeable? So far, however, is this power over our thoughts from being exercised, that we are frequently oppressed, in spite of all our efforts to the contrary, with dreams which affect us wtih the most painful emotions. And, indeed, it is matter of vulgar remark, that our dreams are, in every case, involuntary on our part; and that they appear to be obtruded on us by some external cause. This fact appeared so unaccountable to the late Mr. Baxter, that it gave rise to his very whimsical theory, in which he ascribes dreams to the immediate influence of separate spirits on the mind.

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* No. 487.

3. If the influence of the will be suspended during sleep, the conceptions which we then form of sensible objects will be attended with a belief of their real existence, as much as the *perception* of the same objects is while we are awake.

In treating of the power of Conception, I formerly observed, that our belief of the separate and independent existence of the objects of our perceptions, is the result of experience; which teaches us that these perceptions do not depend on our will. If I open my eyes, I cannot prevent myself from seeing the prospect before me. The case is different with respect to our conceptions. While they occupy the mind, to the exclusion of every thing else, I endeavoured to shew, that they are always accompanied with belief; but as we can banish them from the mind, during our waking hours, at pleasure, and as the momentary belief which they produce, is continually checked by the surrounding objects of our perceptions, we learn to consider them as fictions of our own creation; and, excepting in some accidental cases, pay no regard to them in the conduct of life. If the doctrine, however, formerly stated with respect to conception, be just, and if, at the same time, it be allowed, that sleep suspends the influence of the will over the train of our thoughts, we should naturally be led to expect, that the same belief which accompanies perception while we are awake, should accompany the conceptions which occur to us in our dreams. It is scarcely necessary for me to remark, how strikingly this conclusion coincides with acknowledged facts.

May it not be considered as some confirmation of the foregoing doctrine, that when opium fails in producing complete sleep, it commonly produces *one* of the effects of sleep, by suspending the activity of the mind, and throwing it into a reverie; and that while we are in this state, our conceptions frequently affect us nearly in the same manner, as if the objects conceived were present to our senses?*

Another circumstance with respect to our conceptions during sleep, deserves our notice. As the subjects which we then think upon, occupy the mind exclusively; and as the attention is not diverted by the objects of our external senses, our conceptions must be proportionably lively and steady. Every person knows how faint the conception is; which we form of any thing, with our eyes open, in comparison of what we can form with our eyes shut: and that, in proportion as we can suspend the exercise of all our other senses, the liveliness of our conception increases. To this cause is to be ascribed, in part, the effect which the dread of spirits in the dark has on some persons, who are fully convinced in speculation, that their apprehensions are groundless; and to this also is owing the effect of any accidental perception in giving them a momentary relief from their terrours. Hence the remedy which nature points out to us, when we find ourselves overpowered by imagination. If every thing around us be silent, we endeavour to create a noise, by speaking aloud, or beating with our feet; that is, we strive to divert the attention from the subjects of our imagination, by presenting an object to our powers of perception. The conclusion which I draw from these observations is, that, as there is no state of the body in which our perceptive powers are so totally unemployed as in sleep, it is natural to think, that the objects which we conceive or imagine, must then make an impression on the mind, beyond comparison greater, than any thing of which we can have experience while awake.

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* See the Baron de Tott's Account of the Opium-takers at Constantinople.

From these principles may be derived a simple, and, I think, satisfactory explanation of what some writers have represented as the most mysterious of all the circumstances connected with dreaming; the inaccurate estimate we are apt to form of Time, while we are thus employed;—an inaccuracy which sometimes extends so far, as to give to a single instant the appearance of hours, or perhaps of days. A sudden noise, for example, suggests a dream connected with that perception; and, the moment afterwards, this noise has the effect of awaking us, and yet, during that momentary interval, a long series of circumstances has passed before the imagination. The story quoted by Mr. Addison* from the Turkish Tales, of the Miracle wrought by a Mahometan Doctor, to convince an infidel Sultan, is, in such cases, nearly verified.

The facts I allude to at present are generally explained by supposing, that, in our dreams, the rapidity of thought is greater than while we are awake: but there is no necessity for having recourse to such a supposition. The rapidity of thought is, at all times, such, that, in the twinkling of an eye, a crowd of ideas may pass before us, to which it would require a long discourse to give utterance, and transactions may be conceived, which it would require days to realize. But, in sleep, the conceptions of the mind are mistaken for realities; and therefore, our estimates of time will be formed, not according to our experience of the rapidity of thought, but according to our experience of the time requisite for realizing what we conceive. Something perfectly analogous to this may be remarked in the perceptions we obtain by the sense of sight. When I look into a shew-box, where the deception is imperfect, I see only a set of paltry daubings of a few inches diameter; but, if the representation be executed with so much skill, as to convey to me the

* Spectator, No. 94.

idea of a distant prospect, every object before me swells in its dimensions, in proportion to the extent of space which I conceive it to occupy, and what seemed before to be shut up within the limits of a small wooden frame, is magnified, in my apprehension, to an immense landscape of woods, rivers, and mountains.

The phenomena which we have hitherto explained, take place when sleep seems to be complete; that is, when the mind loses its influence over all those powers whose exercise depends on its will. There are, however, many cases in which sleep seems to be partial; that is, when the mind loses its influence over *some* powers, and retains it over others. In the case of the *somnambuli*, it retains its power over the limbs, but it possesses no influence over its own thoughts, and scarcely any over the body, excepting those particular members of it which are employed in walking. In madness, the power of the will over the body remains undiminished, while its influence in regulating the train of thought is in a great measure suspended; either in consequence of a particular idea, which engrosses the attention, to the exclusion of every thing else, and which we find it impossible to banish by our efforts; or in consequence of our thoughts succeeding each other with such rapidity, that we are unable to stop the train. In both of these kinds of madness, it is worthy of remark, that the conceptions or imaginations of the mind becoming independent of our will, they are apt to be mistaken for actual perceptions, and to affect us in the same manner.

By means of this supposition of a partial sleep, any apparent exceptions, which the history of dreams may afford to the general principles already stated, admit of an easy explanation.

Upon reviewing the foregoing observations, it does not occur to me, that I have in any instance transgressed those rules of philosophizing, which, since the time of Newton, are commonly appealed to, as the tests of sound investigation. For, in the first place, I have not supposed any causes which are not known to exist; and secondly, I have shewn, that the phenomena under our consideration are necessary consequences of the causes to which I have referred them. I have not supposed, that the mind acquires in sleep any new faculty of which we are not conscious while awake; but only (what we know to be a fact) that it retains some of its powers, while the exercise of others is suspended: and I have deduced synthetically the known phenomena of dreaming, from the operation of a particular class of our faculties, unconnected by the operation of another. I flatter myself, therefore, that this inquiry will not only throw some light on the state of the mind in sleep, but that it will have a tendency to illustrate the mutual adaptation and subserviency which exists among the different parts of our constitution, when we are in complete possession of all the faculties and principles which belong to our nature.*

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* See Note (O.)

CHAPTER FIFTH.

PART SECOND.

OF THE INFLUENCE OF ASSOCIATION ON THE INTELLECTUAL AND ON THE ACTIVE POWERS.

SECTION I.

Of the Influence of casual Associations on our speculative Conclusions.

THE Association of Ideas has a tendency to warp our speculative opinions chiefly in the three following ways:

First, by blending together in our apprehensions things which are really distinct in their nature; so as to introduce perplexity and errour into every process of reasoning in which they are involved.

Secondly, by misleading us in those anticipations of the future from the past, which our constitution disposes us to form, and which are the great foundation of our conduct in life.

Thirdly, by connecting in the mind erroneous opinions with truths which irresistibly command our assent, and which we feel to be of importance to human happiness.

A short illustration of these remarks will throw light on the origin of various prejudices; and may, perhaps, suggest some practical hints with respect to the conduct of the understanding.

I. I formerly had occasion to mention several instances of very intimate associations formed between two ideas which have no necessary connexion with each other. One of the most remarkable is that, which exists in every person's mind between the notions of *colour* and of *extension*. The former of these words expresses (at least in the sense in which we commonly employ it) a sensation in the mind; the latter denotes a quality of an external object; so that there is, in fact, no more connexion between the two notions than between those of pain and of solidity;* and yet, in consequence of our always perceiving extension, at the same time at which the sensation of colour is excited in the mind, we find it impossible to think of that sensation, without conceiving extension along with it.

Another intimate association is formed in every mind between the ideas of *space* and of *time*. When we think of an interval of duration, we always conceive it as something analogous to a line, and we apply the same language to both subjects. We speak of a *long* and *short* time, as well of a *long* and *short distance*, and we are not conscious of any metaphor in doing so. Nay, so very perfect does the analogy appear to us, that Boscovich mentions it as a curious circumstance, that extension should have three dimensions, and duration only one.

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* See Note (P.)

This apprehended analogy seems to be founded wholly on an association between the ideas of space and of time, arising from our always measuring the one of these quantities by the other. We measure time by motion, and motion by extension. In an hour, the hand of the clock moves over a certain space; in two hours, over double the space; and so on. Hence the ideas of space and of time become very intimately united, and we apply to the latter the words *long* and *short*, *before* and *after*, in the same manner as to the former.

The apprehended analogy between the relation which the different notes in the scale of music bear to each other, and the relation of superiority and inferiority, in respect of position, among material objects, arises also from an accidental association of ideas.

What this association is founded upon, I shall not take upon me to determine; but that it is the effect of accident, appears clearly from this, that it has not only been confined to particular ages and nations, but is the very reverse of an association which was once equally prevalent. It is observed by Dr. Gregory, in the preface to his edition of Euclid's works, that the more ancient of the Greek writers looked upon grave sounds as high, and acute ones as low; and that the present mode of expression on that subject, was an innovation introduced at a later period.*

In the instances which have now been mentioned, our habit of combining the notions of two things becomes so strong, that we find it impossible to think of the one, without thinking at the same time of the other. Various other examples of the same species of combination, although, perhaps, not altogether so striking in degree, might easily be collected from the subjects about which our metaphysical speculations are employed. The *sensations*, for instance, which are excited in the mind by external objects, and the *perceptions* of material qualities which follow these sensations, are to be distinguished from each other only by long habits of patient reflection. A clear conception of this distinction may be regarded as the key to all Dr. Reid's reasonings concerning the process of nature in perception; and, till it has once been rendered familiar to the reader, a great part of his writings must appear unsatisfactory and obscure. —In truth, our progress in the philosophy of the human mind depends much more on that severe and discriminating judgment, which enables us to separate ideas which nature or habit have intimately combined, than on acuteness of reasoning or fertility of invention. And hence it is, that metaphysical studies are the best of all preparations for those philosophical pursuits which relate to the conduct of life. In none of these do we meet with casual combinations so intimate and indissoluble as those which occur in metaphysics; and he who has been accustomed to such discriminations as this science requires, will not easily be imposed on by that confusion of ideas, which warps the judgments of the multitude in moral, religious, and political inquiries.

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* See Note (Q.)

From the facts which have now been stated, it is easy to conceive the manner in which the association of ideas has a tendency to mislead the judgment, in the first of the three cases already enumerated. When two subjects of thought are so intimately connected together in the mind, that we find it scarcely possible to consider them apart, it must require no common efforts of attention, to conduct any process of reasoning which relates to either. I formerly took notice of the errours to which we are exposed in consequence of the ambiguity of *words;* and of the necessity of frequently checking and correcting our general reasonings by means of particular examples; but in the cases to which I allude at present, there is (if I may use the expression) an ambiguity of *things;* so that even when the mind is occupied about particulars, it finds it difficult to separate the proper objects of its attention from others with which it has been long accustomed to blend them. The cases, indeed, in which such obstinate and invincible associations are formed among different subjects of thought, are not very numerous, and occur chiefly in our metaphysical researches; but in every mind, casual combinations, of an inferior degree of strength, have an habitual effect in disturbing the intellectual powers, and are not to be conquered without persevering exertions, of which few men are capable. The obvious effects which this tendency to combination produces on the judgment, in confounding together those ideas which it is the province of the metaphysician to distinguish, sufficiently illustrate the mode of its operation in those numerous instances, in which its influence, though not so complete and striking, is equally real, and far more dangerous.

II. The association of ideas is a source of speculative errour, by misleading us in those anticipations of the future from the past, which are the foundation of our conduct in life.

The great object of philosophy, as I have already remarked more than once, is to ascertain the laws which regulate the succession of events, both in the physical and moral worlds, in order that when called upon to act in any particular combination of circumstances, we may be enabled to anticipate the probable course of nature from our past experience, and to regulate our conduct accordingly.

As a knowledge of the established connexions among events is the foundation of sagacity and of skill, both in the practical arts, and in the conduct of life, nature has not only given to all men a strong disposition to remark, with attention and curiosity, those phenomena which have been observed to happen nearly at the same time, but has beautifully adapted to the uniformity of her own operations, the laws of association in the human mind. By rendering *contiguity in time* one of the strongest of our associating principles, she has conjoined together in our thoughts, the same events which we have found conjoined in our experience, and has thus accommodated (without any effort on our part) the order of our ideas to that scene in which we are destined to act.

The degree of experience which is necessary for the preservation of our animal existence, is acquired by all men without any particular efforts of study. The laws of nature, which it is most material for us to know, are exposed to the immediate observation of our senses, and establish, by means of the principle of association, a corresponding order in our thoughts, long before the dawn of reason and reflection; or at least long before that period of childhood, to which our recollection afterwards extends.

This tendency of the mind to associate together events which have been presented to it nearly at the same time, although, on the whole, it is attended with infinite advantages, yet, like many other principles of our nature, may occasionally be a source of inconvenience, unless we avail ourselves of our reason and of our experience in keeping it under proper regulation. Among the various phenomena which are continually passing before us, there is a great proportion, whose vicinity in time does not indicate a constancy of conjunction; and unless we be careful to make the distinction between these two classes of connexions, the order of our ideas will be apt to correspond with the one as well as with the other, and our unenlightened experience of the past, will fill the mind, in numberless instances, with vain expectations, or with groundless alarms, concerning the future. This disposition to confound together accidental and permanent connexions, is one great source of popular superstitions. Hence the regard which is paid to unlucky days, to unlucky colours, and to the influence of the planets; apprehensions which render human life, to many, a continued series of absurd terrours. Lucretius compares them to those which children feel, from an idea of the existence of spirits in the dark:

> " Ac veluti pueri trepidant, atque omnia cœcis
> " *In tenebris metuunt, sic nos in luce timemus,*
> " *Interdum nihilo quae sunt metuenda magis.*"

Such spectres can be dispelled by the light of philosophy only; which, by accustoming us to trace established connexions, teaches us to despise those which are casual; and, by giving a proper direction to that bias of the mind which is the foundation of superstition, prevents it from leading us astray.

In the instances which we have now been considering, events come to be combined together in the mind, merely from the accidental circumstance of their contiguity in time, at the moment when we perceived them. Such combinations are confined, in a great measure, to uncultivated and unenlightened minds, or to those individuals, who, from nature or education, have a more than ordinary facility of association. But there are other accidental combinations, which are apt to lay hold of the most vigorous understandings; and from which, as they are the natural and necessary result of a limited experience, no superiority of intellect is sufficient to preserve a philosopher, in the infancy of physical science.

As the connexions among physical events are discovered to us by experience alone, it is evident, that when we see a phenomenon preceded by a number of different circumstances, it is impossible for us to determine, by any reasoning *a priori*, which of these circumstances are to be regarded as the *constant*, and which as the *accidental*, antecedents of the effect. If, in the course of our experience, the same combination of circumstances is always exhibited to us without any alteration, and is invariably followed by the same result, we must for ever remain ignorant, whether this result be connected with the whole combination, or with one or more of the circumstances combined; and therefore, if we are anxious, upon any occasion, to produce a similar effect, the only rule that we can follow with perfect security, is to imitate in every particular circumstance the combination which we have seen. It is only where we have an opportunity of separating such circumstances from each other; of combining them variously together; and of observing the effects which result from these different experiments, that we can ascertain, with precision, the general laws of nature, and strip physical causes of their accidental and unessential concomitants.

To illustrate this by an example. Let us suppose that a savage, who, in a particular instance, had found himself relieved of some bodily indisposition by a draught of cold water, is a second time afflicted with a similar disorder, and is desirous to repeat the same remedy. With the limited degree of experience which we have here supposed him to possess, it would be impossible for the acutest philosopher, in his situation, to determine, whether the cure was owing to the water which was drunk, to the cup in which it was contained, to the fountain from which it was taken, to the particular day of the month, or to the particular age of the moon. In order, therefore, to ensure the success of the remedy, he will very naturally, and very wisely, copy, as far as he can recollect, every circumstance which accompanied the first application of it. He will make use of the same cup, draw the water from the same fountain, hold his body in the same posture, and turn his face in the same direction; and thus all the accidental circumstances in which the first experiment was made, will come to be associated equally in his mind with the effect produced. The fountain from which the water was drawn, will be considered as possessed of particular virtues; and the cup from which it was drunk, will be set apart from vulgar uses, for the sake of those who may afterwards have occasion to apply the remedy. It is the enlargement of experience alone, and not any progress in the art of reasoning, which can cure the mind of these associations, and free the practice of medicine from those superstitious observances, with which we always find encumbered among rude nations.

Many instances of this species of superstition might be produced from the works of philosophers who have flourished in more enlightened ages. In particular, many might be produced from the writings of those physical inquirers who immediately succeeded to

Lord Bacon; and who, convinced by his arguments, of the folly of all reasonings *a priori*, concerning the laws of nature, were frequently apt to run into the opposite extreme, by recording every circumstance, even the most ludicrous, and the most obviously inessential, which attended their experiments.*

The observations which have been hitherto made, relate entirely to associations founded on casual combinations of *material* objects, or of *physical* events. The effects which these associations produce on the understanding, and which are so palpable that they cannot fail to strike the most careless observer, will prepare the reader for the remarks I am now to make, on some analogous prejudices, which warp our opinions on still more important subjects.

As the established laws of the material world, which have been exhibited to our senses from our infancy, gradually accommodate to themselves the order of our thoughts, so the most arbitrary and capricious institutions and customs, by a long and constant and exclusive operation on the mind, acquire such an influence in forming the intellectual habits, that every deviation from them not only produces surprise, but is apt to excite sentiments of contempt and of ridicule. A person who has never extended his views beyond that society of which he himself is a member, is apt to consider many peculiarities in the manners and customs of his countrymen as founded on the universal principles of the human constitution; and when he hears of other nations, whose practices in similar cases are different, he is apt to censure them as unnatural, and to despise them as absurd. There are two classes of men who have more particularly been charged with this weakness; those who are placed at the bottom, and those who have reached the summit of the scale of refinement; the former from ignorance, and the latter from national vanity.

For curing this class of prejudices, the obvious expedient which nature points out to us, is to extend our acquaintance with human affairs, either by means of books, or of personal observation. The effects of travelling, in enlarging and enlightening the mind, are obvious to our daily experience; and similar advantages may be derived (although, perhaps, not in an equal degree) from a careful study of the manners of past ages or of distant nations, as they are described by the historian. In making, however, these attempts for our intellectual improvement, it is of the utmost consequence to us to vary, to a considerable degree, the objects of our attention; in order to prevent any danger of our acquiring an exclusive preference for the caprices of any one people, whose political situation, or whose moral character, may attach us to them as faultless models for our imitation. The same weakness and versatility of mind, the same facility of association, which, in the case of a person who has never extended his views beyond his own community, is a source of national prejudice and of national bigotry, renders the mind, when forced into new situations, easily susceptible of other prejudices no less capricious; and frequently prevents the time, which is devoted to travelling, or to study, from being subservient to any better purpose, than an importation of foreign fashions, or a still more ludicrous imitation of ancient follies.

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* The reader will scarcely believe, that the following cure for a dysentery, is copied verbatim from the works of Mr. Boyle:

"Take the thigh-bone of a hanged man, (perhaps another may serve, but this was still made use of,) calcine it to whiteness, and having purged the patient with an antimonial medicine, give him one dram of this white powder for one dose, in some good cordial, whether conserve or liquor."

The philosopher whose thoughts dwell habitually, not merely upon what is, or what has been, but upon what is best and most expedient for mankind, who, to the study of books, and the observation of manners, has added a careful examination of the principles of the human constitution, and of those which ought to regulate the social order, is the only person who is effectually secured against both the weaknesses which I have described. By learning to separate what is essential to morality and to happiness, from those adventitious trifles which it is the province of fashion to direct, he is equally guarded against the follies of national prejudice, and a weak deviation, in matters of indifference, from established ideas. Upon his mind, thus occupied with important subjects of reflection, the fluctuating caprices and fashions of the times lose their influence; while accustomed to avoid the slavery of local and arbitrary habits, he possesses, in his own genuine simplicity of character, the same power of accommodation to external circumstances, which men of the world derive from the pliability of their taste, and the versatility of their manners. As the order, too, of his ideas is accommodated, not to what is casually presented from without, but to his own systematical principles, his associations are subject only to those slow and pleasing changes which arise from his growing light and improving reason; and, in such a period of the world as the present, when the press not only excludes the possibility of a permanent retrogradation in human affairs, but operates with an irresistible though gradual progress, in undermining prejudices and in extending the triumphs of philosophy, he may reasonably indulge the hope, that society will every day approach nearer and nearer to what he wishes it to be. A man of such a character, instead of looking back on the past with regret, finds himself (if I may use the expression) more at home in the world, and more satisfied with its order, the longer he lives in it. The melancholy contrasts which old men are sometimes disposed to state, between its condition, when they are about to leave it, and that in which they found it at the commencement of their career, arise, in most cases, from the unlimited influence which in their early years they had allowed to the fashions of the times, in the formation of their characters. How different from those sentiments and prospects which dignified the retreat of Turgot, and brightened the declining years of Franklin!

The querulous temper, however, which is incident to old men, although it renders their manners disagreeable in the intercourse of social life, is by no means the most contemptible form in which the prejudices I have now been describing may display their influence. Such a temper indicates at least a certain degree of observation, in marking the vicissitudes of human affairs, and a certain degree of sensibility in early life, which has connected pleasing ideas with the scenes of infancy and youth. A very great proportion of mankind are, in a great measure, incapable either of the one or of the other; and, suffering themselves to be carried quietly along with the stream of fashion, and finding their opinions, and their feelings always in the same relative situation to the fleeting objects around them, are perfectly unconscious of any progress in their own ideas, or of any change in the manners of their age. In vain the philosopher reminds them of the opinions they yesterday held; and forewarns them, from the spirit of the times, of those which they are to hold to-morrow. The opinions of the present moment seem to them to be inseparable from their constitution; and when the prospects are realized, which they lately treated as chimerical, their minds are so gradually prepared for the event, that they behold it without any emotions of wonder or curiosity, and it is to the philosopher alone, by whom it was predicted, that it appears to furnish a subject worthy of future reflection.

The prejudices to which the last observations relate, have their origin in that disposition of our nature, which accommodates the order of our ideas, and our various intellectual habits, to whatever appearances have been long and familiarly presented to the mind. But there are other prejudices, which, by being intimately associated with the essential principles of our constitution, or with the original and universal laws of our belief, are incomparably more inveterate in their nature, and have a far more extensive influence on human character and happiness.

III. The manner in which the association of ideas operates in producing this third class of our speculative errours, may be conceived, in part, from what was formerly said concerning the superstitious observances, which are mixed with the practice of medicine among rude nations. As all the different circumstances which accompanied the first administration of a remedy, come to be considered as essential to its future success, and are blended together in our conceptions, without any discrimination of their relative importance, so, whatever tenets and ceremonies we have been taught to connect with the religious creed of our infancy, become almost a part of our constitution, by being indissolubly united with truths which are essential to happiness, and which we are led to reverence and to love by all the best dispositions of the heart. The astonishment which the peasant feels, when he sees the rites of a religion different from his own, is not less great than if he saw some flagrant breach of the moral duties, or some direct act of impiety to God; nor is it easy for him to conceive, that there can be any thing worthy in a mind which treats with indifference, what awakens in his own breast all its best and sublimest emotions. "Is it possible," (says the old and expiring Bramin, in one of Marmontel's tales, to the young English officer who had saved the life of his daughter,) "is it possible, that "he to whose compassion I owe the preservation of my child, and "who now soothes my last moments with the consolations of piety, "should not believe in the god *Vistnou*, and his nine metamorphoses!"

What has now been said on the nature of religious superstition, may be applied to many other subjects. In particular, it may be applied to those political prejudices which bias the judgment even of enlightened men, in all countries of the world.

How deeply rooted in the human frame are those important principles, which interest the good man in the prosperity of the world, and more especially in the prosperity of that beloved community to which he belongs! How small, at the same time, is the number of individuals who, accustomed to contemplate one modification alone of the social order, are able to distinguish the circumstances which are essential to human happiness, from those which are indifferent or hurtful! In such a situation, how natural is it for a man of benevolence, to acquire an indiscriminate and superstitious veneration for all the institutions under which he has been educated; as these institutions, however capricious and absurd in themselves, are not only familiarized by habit to all his thoughts and feelings, but are consecrated in his mind by an indissoluble association with duties which nature recommends to his affections, and which reason commands him to fulfil. It is on these accounts that a superstitious zeal against innovation both in religion and politics, where it is evidently grafted on piety to God, and good-will to mankind, however it may excite the sorrow of the more enlightened philosopher, is justly entitled, not only to his indulgence, but to his esteem and affection.

The remarks which have been already made, are sufficient to shew, how necessary it is for us, in the formation of our philosophical principles, to examine with care all those opinions which, in our early years, we have imbibed from our instructers; or which are connected with our own local situation. Nor does the universality of an opinion among men who have received a similar education, afford any presumption in its favour; for however great the deference is, which a wise man will always pay to common belief, upon those subjects which have employed the unbiassed reason of mankind, he certainly owes it no respect, in so far as he suspects it to be influenced by fashion or authority. Nothing can be more just than the observation of Fontenelle, that "the number of those who believe in a system already established in the world, does not, in the "least, add to its credibility; but that the number of those who "doubt of it, has a tendency to diminish it."

The same remarks lead, upon the other hand, to another conclusion of still greater importance; that, notwithstanding the various false opinions which are current in the world, there are some truths which are inseparable from the human understanding, and by means of which, the errours of education, in most instances, are enabled to take hold of our belief.

A weak mind, unaccustomed to reflection, and which has passively derived its most important opinions from habit or from authority, when, in consequence of a more enlarged intercourse with the world, it finds, that ideas which it had been taught to regard as sacred, are treated by enlightened and worthy men with ridicule, is apt to lose its reverence for the fundamental and eternal truths on which these accessory ideas are grafted, and easily falls a prey to that sceptical philosophy, which teaches, that all the opinions, and all the principles of action by which mankind are governed, may be traced to the influence of education and example. Amidst the infinite variety of forms, however, which our versatile nature assumes, it cannot fail to strike an attentive observer, that there are certain indelible features common to them all. In one situation, we find good men attached to a republican form of government; in another, to a monarchy; but in all situations, we find them devoted to the service of their country and of mankind, and disposed to regard, with reverence and love, the most absurd and capricious institutions which custom has led them to connect with the order of society. The different appearances, therefore, which the political opinions and the political conduct of men exhibit, while they demonstrate to what a wonderful degree human nature may be influenced by situation and by early instruction, evince the existence of some common and original principles, which fit it for the political union, and illustrate the uniform operation of those laws of association, to which, in all the stages of society, it is equally subject.

Similar observations are applicable, and, indeed, in a still more striking degree, to the opinions of mankind on the important questions of religion and morality. The variety of systems which they have formed to themselves concerning these subjects, has often excited the ridicule of the sceptic and the libertine; but if, on the one hand, this variety shews the folly of bigotry, and the reasonableness of mutual indulgence, the curiosity which has led men in every situation to such speculations, and the influence which their conclusions, however absurd, have had on their character and their happiness, prove, no less clearly, on the other, that there must be some principles from which they all derive their origin; and invite the philosopher to ascertain what are these original and immutable laws of the human mind.

"Examine" (says Mr. Hume) "the religious principles which "have prevailed in the world. You will scarcely be persuaded, "that they are any thing but sick men's dreams; or, perhaps, will "regard them more as the playsome whimsies of monkies in human "shape, than the serious, positive, dogmatical asseverations of a "being, who dignifies himself with the name of rational."—"To "oppose the torrent of scholastic religion by such feeble maxims as "these, that it is impossible for the same thing to be and not to be; "that the whole is greater than a part; that two and three make "five; is pretending to stop the ocean with a bulrush." But what is the inference to which we are led by these observations? Is it, (to use the words of this ingenious writer,) “ that the whole is a “ riddle, an ænigma, an inexplicable mystery; and that doubt, uncertainty, and suspense, appear the only result of our most accurate scrutiny concerning this subject?” Or should not rather the melancholy histories which he has exhibited of the follies and caprices of superstition, direct our attention to those sacred and indelible characters on the human mind, which all these perversions of reason are unable to obliterate; like that image of himself, which Phidias wished to perpetuate, by stamping it so deeply on the buckler of his *Minerva;* “ ut nemo delere posset aut divellere, qui “ totam statuam non imminueret.”* In truth, the more strange the contradictions, and the more ludicrous the ceremonies to which the pride of human reason has thus been reconciled, the stronger is our evidence that religion has a foundation in the nature of man. When the greatest of modern philosophers declares, that “ he would “ rather believe all the fables in the Legend, and the Talmud, and “ the Alcoran, than that this universal frame is without mind;”† he has expressed the same feeling, which, in all ages and nations, has led good men, unaccustomed to reasoning, to an implicit faith in the creed of their infancy;—a feeling which affords an evidence of the existence of the Deity, incomparably more striking, than if, unmixed with errour and undebased by superstition, this most important of all principles had commanded the universal assent of mankind. Where are the other truths, in the whole circle of the sciences, which are so essential to human happiness, as to procure an easy access, not only for themselves, but for whatever opinions may happen to be blended with them? Where are the truths so venerable and commanding, as to impart their own sublimity to every trifling memorial which recalls them to our remembrance; to bestow solemnity and elevation on every mode of expression by which they are conveyed; and which, in whatever scene they have habitually occupied the thoughts, consecrate every object which it presents to our senses, and the very ground we have been accustomed to tread? To attempt to weaken the authority of such impressions, by a detail of the endless variety of forms, which they derive from casual associations, is surely an employment unsuitable to the dignity of philosophy. To the vulgar, it may be amusing, in this, as in other instances, to indulge their wonder at what is new or uncommon; but to the philosopher it belongs to perceive, under all these various disguises, the workings of the same common nature; and in the superstitions of Egypt, no less than in the lofty visions of Plato, to recognize the existence of those moral ties which unite the heart of man to the Author of his being.

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* (That no one might be able to erase it, without injuring the whole statue.) Select Discourses by JOHN SMITH, p. 119. Cambridge, 1673.

† LORD BACON, in his Essays.

SECTION II.

Influence of the Association of Ideas on our Judgments in Matters of Taste.

The very general observations which I am to make in this Section, do not presuppose any particular theory concerning the nature of Taste. It is sufficient for my purpose to remark, that Taste is not a simple and original faculty, but a power gradually formed by experience and observation. It implies, indeed, as its ground-work, a certain degree of natural sensibility; but it implies also the exercise of the judgment; and is the slow result of an attentive examination and comparison of the agreeable or disagreeable effects produced on the mind by external objects.

Such of my readers as are acquainted with "An Essay on the "Nature and principles of Taste," lately published by Mr. Alison, will not be surprised that I decline the discussion of a subject which he has treated with so much ingenuity and elegance.

The view which was formerly given of the process, by which the general laws of the material world are investigated, and which I endeavoured to illustrate by the state of medicine among rude nations, is strictly applicable to the history of Taste. That certain objects are fitted to give pleasure, and others disgust, to the mind, we know from experience alone; and it is impossible for us, by any reasoning *a priori*, to explain *how* the pleasure or the pain is produced. In the works of nature we find, in many instances, Beauty and Sublimity involved among circumstances, which are either indifferent, or which obstruct the general effect: and it is only by a train of experiments, that we can separate those circumstances from the rest, and ascertain with what particular qualities the pleasing effect is connected. Accordingly, the inexperienced artist, when he copies Nature, will copy her servilely, that he may be certain of securing the pleasing effect; and the beauties of his performance will be encumbered with a number of superfluous or of disagreeable concomitants. Experience and observation alone can enable him to make this discrimination, to exhibit the principles of beauty pure and unadulterated, and to form a creation of his own, more faultless than ever fell under the observation of his senses.

This analogy between the progress of Taste from rudeness to refinement, and the progress of physical knowledge from the superstitions of a savage tribe, to the investigation of the laws of nature, proceeds on the supposition, that, as in the material world, there are general facts, beyond which philosophy is unable to proceed, so, in the constitution of man, there is an inexplicable adaptation of the mind to the objects with which his faculties are conversant; in consequence of which, these objects are fitted to produce agreeable or disagreeable emotions. In both cases, reasoning may be employed with propriety to refer particular phenomena to general principles; but in both cases, we must at last arrive at principles of which no account can be given, but that such is the will of our Maker.

A great part, too, of the remarks which were made in the last Section on the origin of popular prejudices, may be applied to explain the influence of casual associations on Taste; but these remarks do not so completely exhaust the subject, as to supersede the necessity of farther illustration. In matters of Taste, the effects which we consider, are produced on the Mind itself; and are accompanied either with pleasure or with pain. Hence the tendency to casual association is much stronger than it commonly is with respect to physical events; and when such associations are once formed, as they do not lead to any important inconvenience, similar to those which result from physical mistakes, they are not so likely to be corrected by mere experience, unassisted by study. To this it is owing, that the influence of association on our judgments concerning beauty and deformity, is still more remarkable than on our speculative conclusions; a circumstance which has led some philosophers to suppose, that association is sufficient to account for the origin of these notions, and that there is no such thing as a standard of Taste, founded on the principles of the human constitution. But this is undoubtedly pushing the theory a great deal too far. The association of ideas can never account for the origin of a new notion, or of a pleasure essentially different from all the others which we know. It may, indeed, enable us to conceive how a thing, indifferent in itself, may become a source of pleasure, by being connected in the mind with something else which is naturally agreeable, but it presupposes, in every instance, the existence of those notions and those feelings which it is its province to combine: in so much that, I apprehend, it will be found, wherever association produces a change in our judgments on matters of Taste, it does so, by co-operating with some natural principle of the mind, and implies the existence of certain original sources of pleasure and uneasiness.

A mode of dress, which at first appeared awkward, acquires, in a few weeks or months, the appearance of elegance. By being accustomed to see it worn by those whom we consider as models of Taste, it becomes associated with the agreeable impressions which we receive from the ease and grace and refinement of their manners. When it pleases by itself, the effect is to be ascribed, not to the object actually before us, but to the impressions with which it has been generally connected, and which it naturally recalls to the mind.

This observation points out the cause of the perpetual vicissitudes in dress, and in every thing whose chief recommendation arises from fashion. It is evident that as far as the agreeable effect of an ornament arises from association, the effect will continue only while it is confined to the higher orders. When it is adopted by the multitude, it not only ceases to be associated with ideas of taste and refinement, but it is associated with ideas of affectation, absurd imitation, and vulgarity. It is accordingly laid aside by the higher orders, who studiously avoid every circumstance in external appearance, which is debased by low and common use; and they are led to exercise their invention in the introduction of some new peculiarities, which first become fashionable, then common, and last of all, are abandoned as vulgar.

It has been often remarked, that after a certain period in the progress of society, the public Taste becomes corrupted; and the different productions of the fine arts begin to degenerate from that simplicity, which they had attained in their state of greatest perfection. One reason of this decline is suggested by the foregoing observations.

From the account which has been given of the natural progress of Taste in separating the genuine principles of beauty from superfluous and from offensive concomitants, it is evident, that there is a limit, beyond which the love of simplicity cannot be carried. No bounds, indeed, can be set to the creations of genius; but as this quality occurs seldom in an eminent degree, it commonly happens, that after a period of great refinement of Taste, men begin to gratify their love of variety, by adding superfluous circumstances to the finished models exhibited by their predecessors, or by making other trifling alterations in them, with a view merely of diversifying the effect. These additions and alterations, indifferent, perhaps, or even in some degree offensive in themselves, acquire soon a borrowed beauty, from the connexion in which we see them, or from the influence of fashion: the same cause which at first produced them, continues perpetually to increase their number; and Taste returns to barbarism, by almost the same steps which conducted it to perfection.

The truth of these remarks will appear still more striking to those who consider the wonderful effect which a writer of splendid genius, but of incorrect taste, has in misleading the public judgment. The peculiarities of such an author are consecrated by the connexion in which we see them, and even please, to a certain degree, when detached from the excellencies of his composition, by recalling to us the agreeable impressions with which they have been formerly associated. How many imitations have we seen of the affectations of Sterne, by men who were unable to copy his beauties? And yet these imitations of his defects; of his abrupt manner; of his minute specification of circumstances; and even of his dashes, produce, at first, some effect on readers of sensibility, but of uncultivated taste, in consequence of the exquisite strokes of the pathetic, and singular vein of humour, with which they are united in the original.

From what has been said, it is obvious, that the circumstances which please, in the objects of Taste, are of two kinds: First, those which are fitted to please by nature, or by associations which all mankind are led to form by their common condition; and Secondly, those which please in consequence of associations arising from local and accidental circumstances. Hence, there are two kinds of Taste:

the one enabling us to judge of those beauties which have a foundation in the human constitution; the other, of such objects as derive their principal recommendation from the influence of fashion.

These two kinds of Taste are not always united in the same person: indeed, I am inclined to think, that they are united but rarely. The perfection of the one depends much upon the degree in which we are able to free the mind from the influence of casual associations; that of the other, on the contrary, depends on a facility of association which enables us to fall in, at once, with all the turns of the fashion, and (as Shakspeare expresses it,) "to catch "the tune of the times."

I shall endeavour to illustrate some of the foregoing remarks, by applying them to the subject of language, which affords numberless instances to exemplify the influence which the association of ideas has on our judgments in matters of Taste.

In the same manner in which an article of dress acquires an appearance of elegance or of vulgarity from the persons by whom it is habitually worn, so a particular mode of pronunciation acquires an air of fashion or of rusticity, from the persons by whom it is habitually employed. The Scotch accent is surely in itself as good as the English; and with a few exceptions, is as agreeable to the ear: and yet how offensive does it appear, even to us, who have been accustomed to hear it from our infancy, when compared with that which is used by our southern neighbours!—No reason can be given for this but that the capital of Scotland is now become a provincial town, and London is the seat of our court.

The distinction which is to be found in the languages of all civilized nations, between low and polite modes of expression, arises from similar causes. It is, indeed, amusing to remark the solicitude with which the higher orders, in the monarchies of modern Europe, avoid every circumstance in their exterior appearance and manner, which, by the most remote association, may, in the minds of others, connect them with the idea of the multitude. Their whole dress and deportment and conversation are studiously arranged to convey an imposing notion of their consequence; and to recall to the spectator by numberless slight and apparently unintentional hints, the agreeable impressions which are associated with the advantages of fortune.

To this influence of association on language, it is necessary for every writer to attend carefully, who wishes to express himself with elegance. For the attainment of correctness and purity in the use of words, the rules of grammarians and of critics may be a sufficient guide; but it is not in the works of this class of authors, that the higher beauties of style are to be studied. As the air and manner of a gentleman can be acquired only by living habitually in the best society, so grace in composition must be attained by an habitual acquaintance with classical writers. It is indeed necessary for our information, that we should peruse occasionally many books which have no merit in point of expression; but I believe it to be extremely useful to all literary men, to counteract the effect of this miscellaneous reading, by maintaining a constant and familiar acquaintance with a few of the most faultless models which the language affords. For want of some standard of this sort, we frequently see an author's taste in writing alter much for the worse in the course of his life; and his later productions fall below the level of his early essays. D'Alembert tells us, that Voltaire had always lying on his table, the Petit Carême of Massillon, and the tragedies of Racine; the former to fix his taste in prose composition, and the latter in poetry.

In avoiding, however, expressions which are debased by vulgar use, there is a danger of running into the other extreme, in quest of fashionable words and phrases. Such an affectation may, for a few years, gratify the vanity of an author, by giving him the air of a man of the world; but the reputation it bestows is of a very transitory nature. The works which continue to please from age to age, are written with perfect simplicity; while those which captivate the multitude by a display of meretricious ornaments, if by chance they should survive the fashions to which they are accommodated, remain only to furnish a subject of ridicule to posterity. The portrait of a beautiful woman in the fashionable dress of the day, may please at the moment it is painted; nay, may perhaps please more than in any that the fancy of the artist could have suggested; but it is only in the plainest and simplest drapery, that the most perfect form can be transmitted with advantage to future times.

The exceptions which the history of literature seems to furnish to these observations, are only apparent. That, in the works of our best authors, there are many beauties which have long and generally been admired, and which yet owe their whole effect to association, cannot be disputed: but in such cases, it will always be found, that the associations which are the foundation of our pleasure, have, in consequence of some peculiar combination of circumstances, been more widely diffused, and more permanently established among mankind, than those which date their origin from the caprices of our own age are ever likely to be. An admiration for the classical remains of antiquity is, at present, not less general in Europe, than the advantages of a liberal education: and such is the effect of this admiration, that there are certain caprices of Taste, from which no man who is well educated is entirely free. A composition in a modern language, which should sometimes depart from the ordinary modes of expression, from an affectation of the idioms which are consecrated in the classics, would please a very wide circle of readers, in consequence of the prevalence of classical associations; and, therefore, such affectations, however absurd when carried to a degree of singularity, are of a far superior class to those which are adapted to the fashions of the day. But still the general principle holds true, that whatever beauties derive their origin merely from casual association, must appear capricious to those to whom the association does not extend; and that the simplest style is that which continues longest to please, and which pleases most universally. In the writings of Mr. Harris, there is a certain classical air, which will always have many admirers, while ancient learning continues to be cultivated, but which, to a mere English reader, appears somewhat unnatural and ungraceful, when compared with the composition of Swift or of Addison.

The analogy of the arts of statuary and painting may be of use in illustrating these remarks. The influence of ancient times has extended to these, as well as to the art of writing; and in this case, no less than in the other, the transcendent power of genius has established a propriety of choice in matters of indifference, and has, perhaps, consecrated, in the opinion of mankind, some of its own caprices.

"Many of the ornaments of art," (says Sir Joshua Reynolds,) "those at least for which no reason can be given, are transmitted "to us, are adopted, and acquire their consequence, from the company in which we have been used to see them. As Greece and "Rome are the fountains from whence have flowed all kinds of "excellence, to that veneration which they have a right to claim "for the pleasure and knowledge which they have afforded us, we "voluntarily add our approbation of every ornament and every custom that belonged to them, even to the fashion of their dress. "For it may be observed, that, not satisfied with them in their own "place, we make no difficulty of dressing statues of modern heroes "or senators in the fashion of the Roman armour, or peaceful robe; "and even go so far as hardly to bear a statue in any other drapery.

"The figures of the great men of those nations have come down "to us in sculpture. In sculpture remain almost all the excellent "specimens of ancient art. We have so far associated personal "dignity to the persons thus represented, and the truth of art to "their manner of representation, that it is not in our power any "longer to separate them. This is not so in painting: because, "having no excellent ancient portraits, that connexion was never "formed. Indeed, we could no more venture to paint a general "officer in a Roman military habit, than we could make a statue in "the present uniform. But since we have no ancient portraits, to "shew how ready we are to adopt those kind of prejudices, we "make the best authority among the moderns serve the same purpose. The great variety of excellent portraits with which Vandyke has enriched this nation, we are not content to admire for "their real excellence, but extend our approbation even to the "dress which happened to be the fashion of that age. By this "means, it must be acknowledged, very ordinary pictures acquired "something of the air and effect of the works of Vandyke, and "appeared therefore, at first sight, better pictures than they really "were. They appeared so, however, to those only who had the "means of making this association."*

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* Reynolds' Discourses, p. 313, et seq. Boston edition, Vol. I. p. 195, &c.

The influence of association on our notions concerning language, is still more strongly exemplified in poetry than in prose. As it is one great object of the poet, in his serious productions, to elevate the imagination of his readers above the grossness of sensible objects, and the vulgarity of common life, it becomes peculiarly necessary for him to reject the use of all words and phrases which are trivial and hackneyed. Among those which are equally pure and equally perspicuous, he, in general, finds it expedient to adopt that which is the least common. Milton prefers the words Rhene and Danaw, to the more common words Rhine and Danube.

> "A multitude, like which the populous North
> "Pour'd never from his frozen loins, to pass
> "Rhene or the Danaw."*

In the following line,

> "Things unattempted yet in prose or rhyme,"

how much more suitable to the poetical style does the expression appear, than if the author had said,

> "Things unattempted yet in prose or verse."

In another passage, where, for the sake of variety, he has made use of the last phrase, he adds an epithet, to remove it a little from the familiarity of ordinary discourse,

> ——"in prose or numerous verse."†

In consequence of this circumstance, there arises gradually in every language a poetical diction, which differs widely from the common diction of prose. It is much less subject to the vicissitudes of fashion, than the polite modes of expression in familiar conversation; because, when it has once been adopted by the poet, it is avoided by good prose writers, as being too elevated for that species of composition. It may therefore retain its charm, as long as the language exists; nay, the charm may increase, as the language grows older.

Indeed, the charm of poetical diction must increase to a certain degree, as polite literature advances. For when once a set of words has been consecrated to poetry, the very sound of them, independently of the ideas they convey, awakens, every time we hear it, the agreeable impressions which were connected with it when we met with them in the performances of our favourite authors. Even when strung together in sentences which convey no meaning, they produce some effect on the mind of a reader of sensibility: an effect, at least, extremely different from that of an unmeaning sentence in prose.

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* Paradise Lost, book i. l. 351.

† Paradise Lost, book i. l. 150. See Newton's edit.

Languages differ from each other widely in the copiousness of their poetical diction. Our own possesses, in this respect, important advantages over the French: not that, in this language, there are no words appropriated to poetry, but because their number is, comparatively speaking, extremely limited.

The scantiness of the French poetical diction is, probably attended with the less inconvenience, that the phrases which occur in good prose writing are less degraded by vulgar application than in English, in consequence of the line being more distinctly and more strongly drawn between polite and low expressions in that language than in ours. Our poets, indeed, by having a language appropriated to their own purposes, not only can preserve a dignity of expression, but can connect with the perusal of their compositions, the pleasing impressions which have been produced by those of their predecessors. And hence, in the higher sorts of poetry, where their object is to kindle, as much as possible, the enthusiasm of their readers, they not only avoid, studiously, all expressions which are vulgar, but all such as are borrowed from fashionable life. This certainly cannot be done in an equal degree by a poet who writes in the French language.

In English, the poetical diction is so extremely copious, that it is liable to be abused; as it puts it in the power of authors of no genius, merely by ringing changes on the poetical vocabulary, to give a certain degree of currency to the most unmeaning compositions. In Pope's *Song by a Person of Quality*, the incoherence of ideas is scarcely greater, than what is to be found in some admired passages of our fashionable poetry.

Nor is it merely by a difference of words, that the language of poetry is distinguished from that of prose. When a poetical *arrangement* of words has once been established by authors of reputation, the most common expressions, by being presented in this consecrated order, may serve to excite poetical associations.

On the other hand, nothing more completely destroys the charm of poetry, than a string of words which the custom of ordinary discourse has arranged in so invariable an order, that the whole phrase may be anticipated from hearing its commencement. A single word frequently strikes us as flat and prosaic, in consequence of its familiarity; but two such words coupled together in the order of conversation can scarcely be introduced into serious poetry without appearing ludicrous.

No poet in our language has shewn so strikingly as Milton, the wonderful elevation which style may derive from an arrangement of words, which, while it is perfectly intelligible, departs widely from that to which we are in general accustomed. Many of his most sublime periods, when the order of the words is altered, are reduced nearly to the level of prose.

is artifice with success, is a much more difficult attain-
ommonly imagined; and, of consequence, when it is
cures an author, to a great degree, from that crowd of
spoil the effect of whatever is not beyond their reach.
who uses blank verse, it is an acquisition of still more
quence than to him who expresses himself in rhyme;
hat the structure of the verse approaches to prose,
necessary to give novelty and dignity to the compo-
ccordingly, among our magazine poets, ten thousand
cture of Pope's versification, for one who approaches
of Milton, or of Thomson.

, however, of this imitation, like every other, increases
er of those who have studied it with success; for the
the authors who have employed their genius in any
, the more copious are the materials out of which
y select and combine, so as to escape the charge of
nd, in fact, in our own language, this, as well as the
esource of poetical expression, the employment of
words, has had its effect so much impaired by the
has been made of it, that a few of our best poets of
avoured to strike out a new path for themselves, by
vation of their composition chiefly on a singular, and,
writer, an unattainable union of harmonious versifi-
natural arrangement of words, and a simple elegance
It is this union which seems to form the distin-
n of the poetry of Goldsmith.

emarks which have been made on the influence of the
ideas on our judgments in matters of taste, it is obvious
opinions of a nation with respect to merit in the fine
ly to be influenced by the form of their government,
f their manners. Voltaire, in his discourse pronounced
n into the French academy, gives several reasons why
that country have not succeeded in describing rural
ployments. The principal one is, the ideas of mean-
erty and wretchedness, which the French are accus-
ciate with the profession of husbandry. The same
d to by the Abbé de Lille, in the preliminary discourse
translation of the Georgics. "A translation," says
em, if it had been undertaken by an author of genius,
been better calculated than any other work, for
e richness of our language. A version of the Æneid
ver well executed, would, in this respect, be of less
s much as the genius of our tongue accommodates
asily to the description of heroic achievements, than
ils of natural phenomena, and of the operations of
To force it to express these with suitable dignity,
been a real conquest over that false delicacy, which
cted from our unfortunate prejudices."

How different must have been the emotions with which this divine performance of Virgil was read by an ancient Roman, while he recollected that period in the history of his country, when dictators were called from the plough to the defence of the state, and after having led monarchs in triumph, returned again to the same happy and independent occupation. A state of manners to which a Roman author of a later age looked back with such enthusiasm, that he ascribes, by a bold poetical figure, the flourishing state of agriculture under the republic, to the grateful returns which the earth then made to the illustrious hands by which she was cultivated.—"Gaudente terra vomere laureato, et triumphali aratore."[*]

SECTION III.

Of the Influence of Association on our active Principles, and on our moral Judgments.

In order to illustrate a little farther, the influence of the Association of Ideas on the human mind, I shall add a few remarks on some of its effects on our active and moral principles. In stating these remarks, I shall endeavour to avoid, as much as possible, every occasion of controversy, by confining myself to such general views of the subject, as do not presuppose any particular enumeration of our original principles of action, or any particular system concerning the nature of the moral faculty. If my health and leisure enable me to carry my plans into execution, I propose, in the sequel of this work, to resume these inquiries, and to examine the various opinions to which they have given rise.

The manner in which the association of ideas operates in producing new principles of action, has been explained very distinctly by different writers. Whatever conduces to the gratification of any natural appetite, or of any natural desire, is itself desired on account of the end to which it is subservient: and by being thus habitually associated in our apprehension with agreeable objects, it frequently comes, in process of time, to be regarded as valuable in itself, independently of its utility. It is thus that wealth becomes, with many, an ultimate object of pursuit; although, at first, it is undoubtedly valued merely on account of its subserviency to the attainment of other objects. In like manner, men are led to desire dress, equipage, retinue, furniture, on account of the estimation in which they are supposed to be held by the public. Such desires are called by Dr. Hutcheson[*] *secondary* desires; and their origin is explained by him in the way which I have mentioned. "Since we are capable," says he, "of reflection, memory, observation, and reasoning about "the distant tendencies of objects and actions, and not confined to "things present, there must arise, in consequence of our original

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[*] Plin. Nat. Hist. xviii. 4.

[†] See his Essay on the Nature and Conduct of the Passions.

"desires, secondary desires of every thing imagined useful to gratify "any of the primary desires; and that with strength proportioned "to the several original desires, and imagined usefulness or necessity of the advantageous object."—"Thus," he continues, "as "soon as we come to apprehend the use of wealth or power to gratify any of our original desires, we must also desire them; and "hence arises the universality of these desires of wealth and power, "since they are the means of gratifying all other desires." The only thing that appears to me exceptionable in the foregoing passage is, that the author classes the desire of power with that of wealth; whereas I apprehend it to be clear, (for reasons which I shall state in another part of this work,) that the former is a primary desire, and the latter a secondary one.

Our moral judgments, too, may be modified, and even perverted, to a certain degree, in consequence of the operation of the same principle. In the same manner in which a person who is regarded as a model of taste may introduce, by his example, an absurd or fantastical dress; so a man of splendid virtues may attract some esteem also to his imperfections, and, if placed in a conspicuous situation, may render his vices and follies objects of general imitation among the multitude.

"In the reign of Charles II." says Mr. Smith,[†] "a degree of licentiousness was deemed the characteristic of a liberal education. "It was connected, according in the notions of those times, with "generosity, sincerity, magnanimity, loyalty; and proved that the "person who acted in this manner, was a gentleman, and not a puritan. Severity of manners, and regularity of conduct, on the "other hand, were altogether unfashionable, and were connected, "in the imagination of that age, with cant, cunning, hypocrisy, and "low manners. To superficial minds, the vices of the great seem "at all times agreeable. They connect them, not only with the "splendour of fortune, but with many superiour virtues which they "ascribe to their superiours; with the spirit of freedom and independency; with frankness, generosity, humanity, and politeness. "The virtues of the inferiour ranks of people, on the contrary, "their parsimonious frugality, their painful industry, and rigid adherence to rules, seem to them mean and disagreeable. They "connect them both with the meanness of the station to which these "qualities commonly belong, and with many great vices which they "suppose usually accompany them; such as an abject, cowardly, ill-"natured, lying, pilfering disposition."

The theory which, in the foregoing passages from Hutcheson and Smith, is employed so justly and philosophically to explain the origin of our secondary desires, and to account for some perversions of our moral judgments, has been thought sufficient, by some later writers, to account for the origin of all our active principles without exception. The first of these attempts to extend so very

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[*] Theory of Moral Sentiments.

far the application of the doctrine of Association was made by the Rev. Mr. Gay, in a dissertation "concerning the fundamental Principle of Virtue," which is prefixed by Dr. Law to his translation of Archbishop King's Essay "On the Origin of Evil." In this dissertation, the author endeavours to shew, "that our approbation of "morality, and all affections whatsoever, are finally resolvable into "reason, pointing out private happiness, and are conversant only "about things apprehended to be means tending to this end; and "that wherever this end is not perceived, they are to be accounted "for from the association of ideas, and may properly be called habits." The same principles have been since pushed to a much greater length by Dr. Hartley, whose system (as he himself informs us) took rise from his accidentally hearing it mentioned as an opinion of Mr. Gay, "that the association of ideas was sufficient to account for all our intellectual pleasures and pains."*

It must, I think, in justice, be acknowledged, that this theory, concerning the origin of our affections, and of the moral sense, is a most ingenious refinement upon the selfish system, as it was formerly taught; and that, by means of it, the force of many of the common reasonings against that system is eluded. Among these reasonings, particular stress has always been laid on the instantaneousness with which our affections operate, and the moral sense approves or condemns, and on our total want of consciousness, in such cases, of any reference to our own happiness. The modern advocates for the selfish system admit the fact to be as it is stated by their opponents; and grant, that after the moral sense and our various affections are formed, their exercise, in particular cases, may become completely disinterested; but still they contend, that it is upon a regard to our own happiness that all these principles are originally grafted. The analogy of avarice will serve to illustrate the scope of this theory. It cannot be doubted that this principle of action is artificial. It is on account of the enjoyments which it enables us to purchase, that money is originally desired; and yet, in process of time, by means of the agreeable impressions which are associated with it, it comes to be desired for its own sake; and even continues to be an object of our pursuit, long after we have lost all relish for those enjoyments which it enables us to command.

Without meaning to engage in any controversy on the subject, I shall content myself with observing, in general, that there must be some limit, beyond which the theory of association cannot possibly be carried; for the explanation which it gives of the formation of new principles of action, proceeds on the supposition that there are other principles previously existing in the mind. The great question then is, when we are arrived at this limit; or, in other words when we are arrived at the simple and original laws of our constitution.

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* Mr. Hume too, who in my opinion has carried this principle of the Association of Ideas a great deal too far, has compared the universality of its application in the philosophy of mind, to that of the principle of attraction in physics. "Here," says he "is a kind of attraction, which in the mental world will be found to have as extraordinary effects as in the natural and to shew itself in as many and as various forms." *Treat. of Hum. Nat.* vol. i. p. 30.

In conducting this inquiry, philosophers have been apt to go into extremes. Lord Kaimes, and some other authors, have been censured, and perhaps justly, for a disposition to multiply original principles to an unnecessary degree. It may be questioned, whether Dr. Hartley, and his followers, have not sometimes been misled by too eager a desire of abridging their number.

Of these two errors, the former is the least common, and the least dangerous. It is the least common, because it is not so flattering as the other to the vanity of a theorist; and it is the least dangerous, because it has no tendency, like the other, to give rise to a suppression, or to a misrepresentation of facts; or to retard the progress of the science, by bestowing upon it an appearance of systematical perfection, to which, in its present state, it is not entitled.

Abstracting, however, from these inconveniences, which must always result from a precipitate reference of phenomena to general principles, it does not seem to me, that the theory in question has any tendency to weaken the foundation of morals. It has, indeed, some tendency, in common with the philosophy of Hobbes and Mandeville, to degrade the dignity of human nature; but it leads to no sceptical conclusions concerning the rule of life. For, although we were to grant, that all our principles of action are acquired; so striking a difference among them must still be admitted, as is sufficient to distinguish clearly those universal laws which were intended to regulate human conduct, from the local habits which are formed by education and fashion. It must still be admitted, that while some active principles are confined to particular individuals, or to particular tribes of men, there are others, which, arising from circumstances in which all the situations of mankind must agree, are common to the whole species. Such active principles as fall under this last description, at whatever period of life they may appear, are to be regarded as a part of human nature, no less than the instinct of suction; in the same manner as the acquired perception of distance by the eye is to be ranked among the perceptive powers of man, no less than the original perceptions of any of our other senses.

Leaving, therefore, the question concerning the origin of our active principles, and of the moral faculty, to be the subject of future discussion, I shall conclude this section with a few remarks of a more practical nature.

It has been shewn by different writers, how much of the beauty and sublimity of material objects arise from the ideas and feelings which we have been taught to associate with them. The impression produced on the external senses of a poet, by the most striking scene in nature, is precisely the same with what is produced on the senses of a peasant or a tradesman: yet how different is the degree of pleasure resulting from this impression! A great part of this difference is undoubtedly to be ascribed to the ideas and feelings which the habitual studies and amusements of the poet have associated with his organical perceptions.

A similar observation may be applied to all the various objects of our pursuit in life. Hardly any one of them is appreciated by any two men in the same manner; and frequently what one man considers as essential to his happiness, is regarded with indifference or dislike by another. Of these differences of opinion, much is, no doubt, to be ascribed to a diversity of constitution, which renders a particular employment of the intellectual or active powers agreeable to one man, which is not equally so to another. But much is also to be ascribed to the effect of association; which, prior to any experience of human life, connects pleasing ideas and pleasing feelings with different objects, in the minds of different persons.

In consequence of these associations, every man appears to his neighbour to pursue the object of his wishes, with a zeal disproportioned to its intrinsic value; and the philosopher (whose principal enjoyment arises from speculation) is frequently apt to smile at the ardour with which the active part of mankind pursue what appear to him to be mere shadows. This view of human affairs some writers have carried so far, as to represent life as a scene of mere illusions, where the mind refers to the objects around it, a colouring, which exists only in itself; and where, as the Poet expresses it,

> "Opinion gilds with varying rays
> "Those painted clouds which beautify our days."

It may be questioned, if these representations of human life be useful or just. That the casual associations which the mind forms in childhood, and in early youth, are frequently a source of inconvenience and of misconduct, is sufficiently obvious; but that this tendency of our nature increases, on the whole, the sum of human enjoyment, appears to me to be indisputable; and the instances in which it misleads us from our duty and our happiness only prove, to what important ends it might be subservient, if it were kept under proper regulation.

Nor do these representations of life (admitting them in their full extent) justify the practical inferences which have been often deduced from them, with respect to the vanity of our pursuits. In every case, indeed, in which our enjoyment depends upon association, it may be said, in one sense, that it arises from the mind itself; but it does not therefore follow, that the external object, which custom has rendered the cause or the occasion of agreeable emotions, is indifferent to our happiness. The effect which the beauties of nature produce on the mind of the poet, is wonderfully heightened by association, but his enjoyment is not, on that account, the less exquisite: nor are the objects of his admiration of the less value to his happiness, that they derive their principal charms from the embellishments of his fancy.

s the business of education, not to counteract, in any instance, tablished laws of our constitution, but to direct them to their er purposes. That the influence of early associations on the might be employed, in the most effectual manner, to aid our l principles, appears evidently from the effects which we daily produce, in reconciling men to a course of action which their n forces them to condemn; and it is no less obvious that, by s of it, the happiness of human life might be increased, and its diminished, if the agreeable ideas and feelings which children o apt to connect with events and with situations which depend e caprice of fortune, were firmly associated in their apprehen- with the duties of their stations, with the pursuits of science, with those beauties of nature which are open to all.

hese observations coincide nearly with the ancient stoical doc- concerning the influence of *imagination*[*] on morals; a subject, hich many important remarks, (though expressed in a form dif- it from that which modern philosophers have introduced, and, aps, not altogether so precise and accurate,) are to be found in Discourses of Epictetus, and in the Meditations of Antoninus.[†] doctrine of the Stoical school Dr. Akenside has in view in the wing passage:

"Action treads the path
"In which Opinion says he follows good,
"Or flies from evil; and Opinion gives
"Report of good or evil, as the scene
"Was drawn by fancy, lovely or deform'd:
"Thus her report can never there be true,
"Where fancy cheats the intellectual eye
"With glaring colours and distorted lines.
"Is there a man, who at the sound of death
"Sees ghastly shapes of terrour conjur'd up,
"And black before him; nought but death bed groans
"And fearful prayers, and plunging from the brink
"Of light and being, down the gloomy air,
"An unknown depth? Alas! in such a mind,
"If no bright forms of excellence attend
"The image of his country, nor the pomp
"Of sacred senates, nor the guardian voice
"Of justice on her throne, nor aught that wakes
"The conscious bosom with a patriot's flame:
"Will not Opinion tell him, that to die,
"Or stand the hazard, is a greater ill
"Than to betray his country? And in act
"Will he not choose to be a wretch and live?
"Here vice begins then."[‡]

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[*] ccording to the use which I make of the words Imagination and Association, in this their effects are obviously distinguishable. I have thought it proper, however, to ate the difference between them a little more fully in Note [R.]

[†] ee what Epictetus has remarked on the χρησις οια δει φαντασιων. (Arrian, l. 1. c. Οια αν πολλακις φαντασθῃς, τοιαυτη σοι εσται η διανοια· βαπτεται γαρ υπο των ιων η ψυχη. βαπτε ουν αυτην, τῃ συνεχεια των τοιουτων φαντασιων, &c. &c. An- . v. c. 16.

[‡] leasures of Imagination, b. iii.

SECTION IV.

General Remarks on the Subjects treated in the foregoing Sections of this Chapter.

In perusing the foregoing Sections of this Chapter, I am aware, that some of my readers may be apt to think that many of the observations which I have made, might easily be resolved into more general principles. I am also aware, that, to the followers of Dr. Hartley, a similar objection will occur against all the other parts of this work; and that it will appear to them the effect of inexcusable prejudice, that I should stop short so frequently in the explanation of phenomena; when he has accounted in so satisfactory a manner, by means of the association of ideas, for all the appearances which human nature exhibits.

To this objection, I shall not feel myself much interested to reply; provided it be granted that my observations are candidly and accurately stated, so far as they reach. Supposing that in some cases I may have stopped short too soon, my speculations, although they may be censured as imperfect, cannot be considered as standing in opposition to the conclusions of more successful inquirers.

May I be allowed farther to observe, that such views of the human mind as are contained in this work, (even supposing the objection to be well founded,) are, in my opinion, indispensably necessary, in order to prepare the way for those very general and comprehensive theories concerning it, which some eminent writers of the present age have been ambitious to form?

Concerning the merit of these theories, I shall not presume to give any judgment. I shall only remark, that, in all the other sciences the progress of discovery has been gradual, from the less general to the more general laws of nature; and that it would be singular, indeed, if, in the Philosophy of the Human Mind, a science, which but a few years ago was confessedly in its infancy, and which certainly labours under many disadvantages peculiar to itself, a step should, all at once, be made to a single principle comprehending all the particular phenomena which we know.

Supposing such a theory to be completely established, it would still be proper to lead the minds of students to it by gradual steps. One of the most important uses of theory, is to give the memory a permanent hold, and a prompt command of the particular facts which we were previously acquainted with; and no theory can be completely understood, unless the mind be led to it nearly in the order of investigation.

It is more particularly useful in conducting the studies of others, to familiarize their minds, as completely as possible, with those laws of nature for which we have the direct evidence of sense, or of consciousness, before directing their inquiries to the more abstruse and refined generalizations of speculative curiosity. In natural philosophy, supposing the theory of Boscovich to be true, it would still be proper, or rather indeed absolutely necessary, to accustom students, in the first stage of their physical education, to dwell on those general physical facts which fall under our actual observation, and about which all the practical arts of life are conversant. In like manner, in the philosophy of mind, there are many general facts for which we have the direct evidence of consciousness. The words Attention, Conception, Memory, Abstraction, Imagination, Curiosity, Ambition, Compassion, Resentment, express powers and principles of our nature, which every man may study by reflecting on his own internal operations. Words corresponding to these, are to be found in all languages, and may be considered as forming the first attempt towards a philosophical classification of intellectual and moral phenomena. Such a classification, however imperfect and indistinct, we may be assured, must have some foundation in nature; and it is at least prudent, for a philosopher to keep it in view as the groundwork of his own arrangement. It not only directs our attention to those facts in the human constitution, on which every solid theory in this branch of science must be founded; but to the facts, which, in all ages, have appeared to the common sense of mankind, to be the most striking and important; and of which it ought to be the great object of theorists, not to supersede, but to facilitate the study.

There is indeed good reason for believing, that many of the facts, which our consciousness would lead us to consider, upon a superficial view, as ultimate facts, are resolvable into other principles still more general. "Long before we are capable of reflection," (says Dr. Reid) "the original perceptions and notions of the mind are so "mixed, compounded and decompounded, by habits, associations, "and abstractions, that it is extremely difficult for the mind to return "upon its own footsteps, and trace back those operations which "have employed it since it first began to think and to act." The same author remarks, that, "if we could obtain a distinct and full "history of all that hath passed in the mind of a child, from the be"ginning of life and sensation, till it grows up to the use of reason; "how its infant faculties began to work, and how they brought forth "and ripened all the various notions, opinions, and sentiments, "which we find in ourselves when we come to be capable of reflec"tion; this would be a treasure of Natural History, which would "probably give more light into the human faculties, than all the "systems of philosophers about them, since the beginning of the "world."

To accomplish an analysis of these complicated phenomena into the simple and original principles of our constitution, is the great object of this branch of philosophy; but, in order to succeed, it is necessary to ascertain facts before we begin to reason, and to avoid generalizing, in any instance, till we have completely secured the ground that we have gained. Such a caution, which is necessary in all the sciences, is, in a more peculiar manner, necessary here, where the very facts from which all our inferences must be drawn, are to be ascertained only by the most patient attention; and where almost all of them are, to a great degree, disguised, partly by the inaccuracies of popular language, and partly by the mistaken theories of philosophers

I have only to add, that, although I have retained the phrase of the Association of Ideas, in compliance with common language, I am far from being completely satisfied with this mode of expression. I have retained it, chiefly that I might not expose myself to the censure of delivering old doctrines in a new form.

As I have endeavoured to employ it with caution, I hope that it has not often misled me in my reasonings. At the same time, I am more and more convinced of the advantages to be derived from a reformation of the common language in most of the branches of science. How much such a reformation has effected in Chemistry is well known; and it is evidently much more necessary in the Philosophy of Mind, where the prevailing language adds to the common inaccuracies of popular expressions, the peculiar disadvantage, of being all suggested by the analogy of matter. Often, in the composition of this work, have I recollected the advice of Bergman to Morveau.[*] "In reforming the nomenclature of chemistry, spare "no word which is improper. They who understand the subject "already, will suffer no inconvenience; and they to whom the subject is new, will comprehend it with the greater facility." But it belongs to such authors alone, as have extended the boundaries of science by their own discoveries, to introduce innovations in language with any hopes of success.

CHAPTER SIXTH.

OF MEMORY.

SECTION I.

General Observations on Memory.

Among the various powers of the understanding, there is none which has been so attentively examined by philosophers, or concerning which so many important facts and observations have been collected, as the faculty of Memory. This is partly to be ascribed to its nature, which renders it easily distinguishable from all the other principles of our constitution, even by those who have not been accustomed to metaphysical investigations, and partly to its immediate subserviency, not only to the pursuits of science, but to the ordinary business of life; in consequence of which, many of its most curious laws had been observed long before any analysis was attempted of the other powers of the mind; and have, for many ages, formed a part of the common maxims which are to be found in every treatise of education. Some important remarks on the subject may, in particular, be collected from the writings of the ancient rhetoricians.

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[*] "Le savant Professeur d'Upsal, M. Bergman, écrivoit à M. de Morveau dans les derniers temps de sa vie; Ne faites graces à aucune denomination impropre. Ceux qui savent déja entendront toujours; ceux qui ne savent pas encore entendront plutôt." Methode de Nomenclat. Chémique, par MM. MORVEAU, LAVOISIER, &c

The word Memory is not employed uniformly in the same precise sense; but it always expresses some modification of that faculty, which enables us to treasure up, and preserve for future use, the knowledge we acquire; a faculty which is obviously the great foundation of all intellectual improvement, and without which, no advantage could be derived from the most enlarged experience. This faculty implies two things: a capacity of retaining knowledge; and a power of recalling it to our thoughts when we have occasion to apply it to use. The word Memory is sometimes employed to express the capacity, and sometimes the power. When we speak of a retentive memory, we use it in the former sense; when of a ready memory, in the latter.

The various particulars which compose our stock of knowledge are, from time to time, recalled to our thoughts, in one of two ways; sometimes they recur to us spontaneously, or at least, without any interference on our part; in other cases, they are recalled, in consequence of an effort of our will. For the former operation of the mind, we have no appropriated name in our language, distinct from Memory. The latter, too, is often called by the same name, but is more properly distinguished by the word Recollection.

There are, I believe, some other acceptations besides these in which the word Memory has been occasionally employed; but as its ambiguities are not of such a nature as to mislead us in our present inquiries, I shall not dwell any longer on the illustration of distinctions, which to the greater part of readers might appear uninteresting and minute. One distinction only relative to this subject occurs to me, as deserving particular attention.

The operations of Memory relate either to things and their relations, or to events. In the former case, thoughts which have been previously in the mind, may recur to us, without suggesting the idea of the past, or of any modification of time whatever; as when I repeat over a poem which I have got by heart, or when I think of the features of an absent friend. In this last instance, indeed, philosophers distinguish the act of the mind by the name of Conception; but in ordinary discourse, and frequently even in philosophical writing, it is considered as an exertion of Memory. In these and similar cases, it is obvious that the operations of this faculty do not necessarily involve the idea of the past.

The case is different with respect to the memory of events. When I think of these, I not only recall to the mind the former objects of its thoughts, but I refer the event to a particular point of time; so that of every such act of memory, the idea of the past is a necessary concomitant.

I have been led to take notice of this distinction, in order to obviate an objection which some of the phenomena of Memory seem to present, against a doctrine which I formerly stated, when treating of the powers of Conception and Imagination.

It is evident, that when I think of an event, in which any object of sense was concerned, my recollection of the event must necessarily involve an act of Conception. Thus, when I think of a dramatick representation which I have recently seen, my recollection of what I saw necessarily involves a conception of the different actors by whom it was performed. But every act of recollection which relates to events, is accompanied with a belief of their past existence. How then are we to reconcile this conclusion with the doctrine formerly maintained concerning Conception, according to which every exertion of that power is accompanied with a belief, that its object exists before us at the present moment?

The only way that occurs to me of removing this difficulty, is by supposing, that the remembrance of a past event is not a simple act of the mind; but that the mind first forms a conception of the event, then judges from circumstances, of the period of time to which it is to be referred: a supposition which is by no means a gratuitous one, invented to answer a particular purpose, but which, as far as I am able to judge, is agreeable to fact: for if we have the power, as will not be disputed of conceiving a past event without any reference to time, it follows that there is nothing in the ideas or notions which memory presents to us, which is necessarily accompanied with a belief of past existence, in a way analogous to that in which our perceptions are accompanied with a belief of the present existence of their objects; and therefore, that the reference of the event to the particular period at which it happened, is a judgment founded on concomitant circumstances. So long as we are occupied with the conception of any particular object connected with the event, we believe the present existence of the object; but this belief, which, in most cases, is only momentary, is instantly corrected by habits of judging acquired by experience; and as soon as the mind is disengaged from such a belief, it is left at liberty to refer the event to the period at which it actually happened. Nor will the apparent instantaneousness of such judgments be considered as an unsurmountable objection to the doctrine now advanced, by those who have reflected on the perception of distance obtained by sight, which, although it seems to be as immediate as any perception of touch, has been shewn by philosophers to be the result of a judgment founded on experience and observation. The reference we make of past events to the particular points of time at which they took place, will, I am inclined to think, the more we consider the subject, be found the more strikingly analogous to the estimates of distance we learn to form by the eye.

Although, however, I am, myself, satisfied with the conclusion to which the foregoing reasonings lead, I am far from expecting that the case will be the same with all my readers. Some of their objections, which I can easily anticipate, might, I believe, be obviated by a little farther discussion; but as the question is merely a matter of curiosity, and has no necessary connexion with the observations I am to make in this Chapter, I shall not prosecute the subject at present. The opinion, indeed, we form concerning it, has no reference to any of the doctrines maintained in this work, excepting to a particular speculation concerning the belief accompanying conception, which I ventured to state, in treating of that subject, and which, as it appears to be extremely doubtful to some whose opinions I respect, I proposed with a degree of diffidence suitable to the difficulty of such an inquiry. The remaining observations which I am to make on the power of memory, whatever opinion may be formed of their importance, will furnish but little room for a diversity of judgment concerning their truth.

In considering this part of our constitution, one of the most obvious and striking questions that occurs, is, what the circumstances are which determine the memory to retain some things in preference to others? Among the subjects which successively occupy our thoughts, by far the greater number vanish, without leaving a trace behind them; while others become, as it were, a part of ourselves, and, by their accumulations, lay a foundation for our perpetual progress in knowledge. Without pretending to exhaust the subject, I shall content myself at present with a partial solution of this difficulty, by illustrating the dependence of memory upon two principles of our nature, with which it is plainly very intimately connected; attention, and the association of ideas.

I endeavoured in a former chapter to shew, that there is a certain act of the mind, (distinguished, both by philosophers and the vulgar, by the name of attention,) without which even the objects of our perceptions make no impression on the memory. It is also matter of common remark, that the permanence of the impression which any thing leaves in the memory, is proportioned to the degree of attention which was originally given to it. The observation has been so often repeated, and is so manifestly true, that it is unnecessary to offer any illustration of it.*

I have only to observe farther, with respect to attention, considered in the relation in which it stands to memory, that although it be a voluntary act, it requires experience to have it always under command. In the case of objects to which we have been taught to attend at an early period of life, or which are calculated to rouse the curiosity, or to affect any of our passions, the attention fixes itself upon them, as it were spontaneously, and without any effort on our part, of which we are conscious. How perfectly do we remember, and even retain, for a long course of years, the faces and the handwritings of our acquaintances, although we never took any particular pains to fix them in the memory? On the other hand, if an object does not interest some principle of our nature, we may examine it again and again, with a wish to treasure up the knowledge of it in the mind, without our being able to command that degree of attention which may lead us to recognise it the next time we see it. A person, for example, who has not been accustomed to attend particularly to horses or to cattle, may study for a considerable time the appearance of a horse or of a bullock, without being able a few days afterwards to pronounce on his identity; while a horse-dealer or a grazier recollects many hundreds of that class of animals with which he is conversant, as perfectly as he does the faces of his acquaintances. In order to account for this, I would remark, that although attention be a voluntary act, and although we are always able, when we choose, to make a momentary exertion of it; yet, unless the object to which it is directed be really interesting, in some degree, to the curiosity, the train of our ideas goes on, and we immediately forget our purpose. When we are employed, therefore, in studying such an object, it is not an exclusive and steady attention that we give to it, but we are losing sight of it, and recurring to it every instant; and the painful efforts of which we are conscious, are not (as we are apt to suppose them to be) efforts of uncommon attention, but unsuccessful attempts to keep the mind steady to its object, and to exclude the extraneous ideas, which are from time to time soliciting its notice.

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* It seems to be owing to this dependence of memory on attention, that it is easier to get by heart a composition, after a very few readings, with an attempt to repeat it at the end of each, than after a hundred readings without such an effort. The effort rouses the attention from that languid state in which it remains, while the mind is giving a passive reception to foreign ideas. The fact is remarked by Lord Bacon, and is explained by him on the same principle to which I have referred it.

"Quae expectantur et attentionem excitant, melius haerent quam quae praetervolant. Itaque si scriptum aliquod vicies perlegeris, non tam facile illud memoriter disces, quam si illud legas decies, tentando interim illud recitare, et ubi deficit memoria, inspiciendo librum." BACON, *Nov. Org.* lib. ii. aph. 26.

If these observations be well founded, they afford an explanation of a fact which has been often remarked, that objects are easily remembered which affect any of the passions.[*] The passion assists the memory, not in consequence of any immediate connexion between them, but as it presents, during the time it continues, a steady and exclusive object to the attention.

The connexion between memory and the association of ideas is so striking, that it has been supposed by some, that the whole of its phenomena might be resolved into this principle. But this is evidently not the case. The association of ideas connects our various thoughts with each other, so as to present them to the mind in a certain order; but it presupposes the existence of these thoughts in the mind; or, in other words, it presupposes a faculty of retaining the knowledge which we acquire. It involves also a power of recognising as former objects of attention, the thoughts that from time to time occur to us; a power which is not implied in that law of our nature which is called the association of ideas. It is possible, surely, that our thoughts might have succeeded each other, according to the same laws as at present, without suggesting to us at all the idea of the past; and, in fact, this supposition is realized to a certain degree in the case of some old men, who retain pretty exactly the information which they receive, but are sometimes unable to recollect in what manner the particulars which they find connected together in their thoughts, at first came into the mind; whether they occurred to them in a dream, or were communicated to them in conversation.

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[*] "Si quas res in vita videmus parvas, usitatas, quotidianas, eas meminisse non solemus; propterea quod nulla nisi nova aut admirabili re commovetur animus. At si quid videmus aut audimus egregie turpe, aut honestum, inusitatum, magnum, incredibile, ridiculum, id diu meminisse consuevimus." *Cic: Ad Herenn.* lib. 3.

On the other hand, it is evident, that without the associating principle, the powers of retaining our thoughts, and of recognising them when they occur to us, would have been of little use; for the most important articles of our knowledge might have remained latent in the mind, even when those occasions presented themselves to which they are immediately applicable. In consequence of this law of our nature, not only are all our various ideas made to pass, from time to time, in review before us, and to offer themselves to our choice as subjects of meditation, but when an occasion occurs which calls for the aid of our past experience, the occasion itself recalls to us all the information upon the subject, which that experience has accumulated.

The foregoing observations comprehend an analysis of memory sufficiently accurate for my present purpose: some other remarks, tending to illustrate the same subject more completely, will occur in the remaining sections of this chapter.

It is hardly necessary for me to add, that when we have proceeded so far in our inquiries concerning Memory, as to obtain an analysis of that power, and to ascertain the relation in which it stands to the other principles of our constitution, we have advanced as far towards an explanation of it as the nature of the subject permits. The various theories which have attempted to account for it by traces or impressions in the sensorium, are obviously too unphilosophical to deserve a particular refutation.* Such, indeed, is the poverty of language, that we cannot speak on the subject without employing expressions which suggest one theory or another; but it is of importance for us always to recollect, that these expressions are entirely figurative, and afford no explanation of the phenomena to which they refer. It is partly with a view to remind my readers of this consideration, that, finding it impossible to lay aside completely metaphorical or analogical words, I have studied to avoid such an uniformity in the employment of them, as might indicate a preference to one theory rather than another; and by doing so, have perhaps sometimes been led to vary the metaphor oftener and more suddenly, than would be proper in a composition which aimed at any degree of elegance. This caution in the use of the common language concerning memory, it seemed to me the more necessary to attend to, that the general disposition which every person feels at the commencement of his philosophical pursuits, to explain the phenomena of thought by the laws of matter, is, in the case of this particular faculty, encouraged by a variety of peculiar circumstances. The analogy between committing a thing to memory that we wish to remember, and engraving on a tablet a fact that we wish to record, is so striking as to present itself even to the vulgar; nor is it perhaps less natural to indulge the fancy in considering memory as a sort of repository, in which we arrange and preserve for future use the materials of our information. The immediate dependence, too, of this faculty on the state of the body, which is more remarkable than that of any other faculty whatever, (as appears from the effects produced on it by old age, disease, and intoxication,) is apt to strike those who have not been much conversant with these inquiries, as bestowing some plausibility on the theory which attempts to explain its phenomena on mechanical principles.

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* See Note (S.)

I cannot help taking this opportunity of expressing a wish, that medical writers would be at more pains than they have been at hitherto, to ascertain the various effects which are produced on the memory by disease and old age. These effects are widely diversified in different cases. In some it would seem that the memory is impaired in consequence of a diminution of the power of attention; in others, that the power of recollection is disturbed in consequence of a derangement of that part of the constitution on which the association of ideas depends. The decay of memory which is the common effect of age, seems to arise from the former of these causes. It is probable, that, as we advance in years, the capacity of attention is weakened by some physical change in the constitution; but it is also reasonable to think, that it loses its vigour partly from the effect which the decay of our sensibility, and the extinction of our passions have, in diminishing the interest which we feel in the common occurrences of life. That no derangement takes place, in ordinary cases, in that part of the constitution on which the association of ideas depends, appears from the distinct and circumstantial recollection which old men retain of the transactions of their youth.* In some diseases, this part of the constitution is evidently affected. A stroke of the palsy has been known, (while it did not destroy the power of speech,) to render the patient incapable of recollecting the names of the most familiar objects. What is still more remarkable, the name of an object has been known to suggest the idea of it as formerly, although the sight of the object ceased to suggest the name.

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* Swift somewhere expresses his surprise, that old men should remember their anecdotes so distinctly, and should, notwithstanding, have so little memory as to tell the same story twice in the course of the same conversation; and a similar remark is made by Montaigne, in one of his Essays. "Surtout les Vieillards sont dangereux, à qui la souvenance des choses passées demeure, et ont perdu la souvenance de leurs redites."—Liv. i. cap. ix. (Des Menteurs.)

The fact seems to be, that all their old ideas remain in the mind, connected as formerly by the different associating principles; but that the power of attention to new ideas and new occurrences is impaired.

In so far as this decay of memory which old age brings along with it is a necessary consequence of a physical change in the constitution, or a necessary consequence of a diminution of sensibility, it is the part of a wise man to submit cheerfully to the lot of his nature. But it is not unreasonable to think, that something may be done by our own efforts, to obviate the inconveniences which commonly result from it. If individuals, who, in the early part of life, have weak memories, are sometimes able to remedy this defect, by a greater attention to arrangement in their transactions, and to classification among their ideas, than is necessary to the bulk of mankind, might it not be possible, in the same way, to ward off, at least to a certain degree, the encroachments which time makes on this faculty? The few old men who continue in the active scenes of life to the last moment, it has been often remarked, complain, in general, much less of a want of recollection, than their cotemporaries. This is undoubtedly owing partly to the effect which the pursuits of business must necessarily have, in keeping alive the power of attention. But it is probably owing also to new habits of arrangement, which the mind gradually and insensibly forms, from the experience of its growing infirmities. The apparent revival of memory in old men, after a temporary decline, (which is a case that happens not unfrequently,) seems to favour this supposition.

One old man, I have, myself, had the good fortune to know, who, after a long, an active, and an honourable life, having begun to feel some of the usual effects of advanced years, has been able to find resources in his own sagacity against most of the inconveniences with which they are commonly attended; and who, by watching his gradual decline with the cool eye of an indifferent observer, and employing his ingenuity to retard its progress, has converted even the infirmities of age into a source of philosophical amusement.

SECTION II.

Of the Varieties of Memory in different Individuals.

It is generally supposed, that, of all our faculties, Memory is that which nature has bestowed in the most unequal degrees on different individuals; and it is far from being impossible that this opinion may be well founded. If, however, we consider, that there is scarcely any man who has not memory sufficient to learn the use of language, and to learn to recognise, at the first glance, the appearances of an infinite number of familiar objects; besides acquiring such an acquaintance with the laws of nature, and the ordinary course of human affairs, as is necessary for directing his conduct in life; we shall be satisfied that the original disparities among men, in this respect, are by no means so immense as they seem to be at first view; and that much is to be ascribed to different habits of attention, and to a difference of selection among the various objects and events presented to their curiosity.

As the great purpose to which this faculty is subservient, is to enable us to collect, and to retain for the future regulation of our conduct, the results of our past experience; it is evident that the degree of perfection which it attains in the case of different persons, must vary; first, with the facility of making the original acquisition; secondly, with the permanence of the acquisition; and thirdly, with the quickness or readiness with which the individual is able, on particular occasions, to apply it to use. The qualities, therefore, of a good memory are, in the first place, to be susceptible; secondly, to be retentive; and thirdly, to be ready.

It is but rarely that these three qualities are united in the same person. We often, indeed, meet with a memory which is at once susceptible and ready; but I doubt much, if such memories be commonly very retentive: for, susceptibility and readiness are both connected with a facility of associating ideas, according to their more obvious relations; whereas retentiveness, or tenaciousness of memory, depends principally on what is seldom united with this facility, a disposition to system and to philosophical arrangement. These observations it will be necessary to illustrate more particularly.

I have already remarked, in treating of a different subject, that the bulk of mankind, being but little accustomed to reflect and to generalize, associate their ideas chiefly according to their more obvious relations; those, for example, of resemblance and of analogy; and above all, according to the casual relations arising from contiguity in time and place: whereas, in the mind of a philosopher, ideas are commonly associated according to those relations which are brought to light in consequence of particular efforts of attention; such as the relations of Cause and Effect, or of Premises and Conclusion. This difference in the modes of association of these two classes of men, is the foundation of some very striking diversities between them in respect of intellectual character.

In the first place, in consequence of the nature of the relations which connect ideas together in the mind of the philosopher, it must necessarily happen, that when he has occasion to apply to use his acquired knowledge, time and reflection will be requisite to enable him to recollect it. In the case of those, on the other hand, who have not been accustomed to scientific pursuits; as their ideas are connected together according to the most obvious relations, when any one idea of a class is presented to the mind, it is immediately followed by the others, which succeed each other spontaneously according to the laws of association. In managing, therefore, the little details of some subaltern employment, in which all that is required is a knowledge of forms, and a disposition to observe them, the want of a systematical genius is an important advantage; because this want renders the mind peculiarly susceptible of habits, and allows the train of its ideas to accommodate itself perfectly to the daily and hourly occurrences of its situation. But if, in this respect, men of no general principles have an advantage over the philosopher, they fall greatly below him in another point of view; in as much as all the information which they possess, must necessarily be limited by their own proper experience, whereas the philosopher, who is accustomed to refer every thing to general principles, is not only enabled, by means of these, to arrange the facts which experience has taught him, but by reasoning from his principles synthetically, has it often in his power to determine facts *a priori*, which he has no opportunity of ascertaining by observation.

It follows farther from the foregoing principles, that the intellectual defects of the philosopher are of a much more corrigible nature, than those of the mere man of detail. If the former is thrown by accident into a scene of business, more time will perhaps be necessary to qualify him for it, than would be requisite for the generality of mankind; but time and experience will infallibly, sooner or later, familiarize his mind completely with his situation. A capacity for system and for philosophical arrangement, unless it has been carefully cultivated in early life, is an acquisition which can scarcely ever be made afterwards; and, therefore, the defects which I already mentioned, as connected with early and constant habits of business, adopted from imitation, and undirected by theory, may, when once these habits are confirmed, be pronounced to be incurable.

I am also inclined to believe, both from a theoretical view of the subject, and from my own observations as far as they have reached, that if we wish to fix the particulars of our knowledge very permanently in the memory, the most effectual way of doing it, is to refer them to general principles. Ideas which are connected together merely by casual relations, present themselves with readiness to the mind, so long as we are forced by the habits of our situation to apply them to daily use; but when a change of circumstances leads us to vary the objects of our attention, we find our old ideas gradually to escape from the recollection: and if it should happen that they escape from it altogether, the only method of recovering them, is by renewing those studies by which they were at first acquired. The case is very different with a man whose ideas, presented to him at first by accident, have been afterwards philosophically arranged and referred to general principles. When he wishes to recollect them, some time and reflection will, frequently, be necessary to enable him to do so; but the information which he has once completely acquired, continues, in general, to be an acquisition for life; or if, accidentally, any article of it should be lost, it may often be recovered by a process of reasoning.

Something very similar to this happens in the study of languages. A person who acquires a foreign language merely by the ear, and without any knowledge of its principles, commonly speaks it, while he remains in the country where it is spoken, with more readiness and fluency, than one who has studied it grammatically; but in the course of a few years absence, he finds himself almost as ignorant of it as before he acquired it. A language of which we once understand the principles thoroughly, it is hardly possible to lose by disuse.

A philosophical arrangement of our ideas is attended with another very important advantage. In a mind where the prevailing principles of association are founded on casual relations among the various objects of its knowledge, the thoughts must necessarily succeed each other in a very irregular and disorderly manner, and the occasions on which they present themselves, will be determined merely by accident. They will often occur, when they cannot be employed to any purpose; and will remain concealed from our view, when the recollection of them might be useful. They cannot therefore be considered as under our own proper command. But in the case of a philosopher, how slow soever he may be in the recollection of his ideas, he knows always where he is to search for them, so as to bring them all to bear on their proper object. When he wishes to avail himself of his past experience, or of his former conclusions, the occasion itself summons up every thought in his mind which the occasion requires. Or if he is called upon to exert his powers of invention and of discovery, the materials of both are always at hand, and are presented to his view with such a degree of connexion and arrangement, as may enable him to trace, with ease, their various relations. How much invention depends upon a patient and attentive examination of our ideas, in order to discover the less obvious relations which subsist among them, I had occasion to show, at some length, in a former Chapter.

The remarks which have been now made, are sufficient to illustrate the advantages which the philosopher derives in the pursuits of science, from that sort of systematical memory which his habits of arrangement give him. It may however be doubted, whether such habits be equally favourable to a talent for agreeable conversation, at least, for that lively, varied, and unstudied conversation, which forms the principal charm of a promiscuous society. The conversation which pleases generally, must unite the recommendations of quickness, of ease, and of variety: and in all these three respects, that of the philosopher is apt to be deficient. It is deficient in quickness, because his ideas are connected by relations which occur only to an attentive and collected mind. It is deficient in ease, because these relations are not the casual and obvious ones, by which ideas are associated in ordinary memories, but the slow discoveries of patient, and often painful, exertion. As the ideas, too, which he associates together, are commonly of the same class, or at least are referred to the same general principles, he is in danger of becoming tedious, by indulging himself in long and systematical discourses; while another, possessed of the most inferiour accomplishments, by laying his mind completely open to impressions from without, and by accommodating continually the course of his own ideas, not only to the ideas which are started by his companions, but to every trifling and unexpected accident that may occur to give them a new direction, is the life and soul of every society into which he enters. Even the anecdotes which the philosopher has collected, however agreeable they may be in themselves, are seldom introduced by him into conversation with that unstudied but happy propriety, which we admire in men of the world, whose facts are not referred to general principles, but are suggested to their recollection by the familiar topics and occurrences of ordinary life. Nor is it the imputation of tediousness merely, to which the systematical thinker must submit from common observers. It is but rarely possible to explain completely, in a promiscuous society, all the various parts of the most simple theory; and as nothing appears weaker or more absurd than a theory which is partially stated, it frequently happens, that men of ingenuity, by attempting it, sink, in the vulgar apprehension, below the level of ordinary understandings. "Theoriarum vires" (says Lord Bacon) "in apta et se mutuo sustinente partium harmonia, et quadam in "orbem demonstratione, consistunt, ideoque per partes traditæ "infirmæ sunt."

Before leaving the subject of Casual Memory, it may not be improper to add, that how much soever it may disqualify for systematical speculation, there is a species of loose and rambling composition, to which it is peculiarly favourable. With such performances, it is often pleasant to unbend the mind in solitude, when we are more in the humour for conversation, than for connected thinking. Montaigne is unquestionably at the head of this class of authors. "What, indeed, are his Essays," (to adopt his own account of them,) "but grotesque pieces of patch-work, put together with- "out any certain figure; or any order, connexion, or proportion, "but what is accidental?"[*]

It is, however, curious, that in consequence of the predominance in his mind of this species of Memory above every other, he is forced to acknowledge his total want of that command over his ideas, which can only be founded on habits of systematical arrangement. As the passage is extremely characteristical of the author, and affords a striking confirmation of some of the preceding observations, I shall give it in his own words. "Je ne me tiens pas bien "en ma possession et disposition : le hazard y a plus de droit que "moy : l' occasion, la compagnie, le branle même de ma voix tire "plus de mon esprit, que je n'y trouve lors que je sonde et em- "ploye à part moy. Ceci m'advient aussi, que je ne me trouve "pas où je me cherche ; et me trouve plus par rencontre, que par "l'inquisition de mon jugement."[†]

The differences which I have now pointed out between philosophical and casual Memory, constitute the most remarkable of all the varieties which the minds of different individuals, considered in respect to this faculty, present to our observation. But there are other varieties, of a less striking nature, the consideration of which may also suggest some useful reflections.

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[*] Liv. i. chap. 27.

[†] Liv. i. chap. 10. (Du parler prompt ou tardif.)

It was before remarked, that our ideas are frequently associated, in consequence of the associations which take place among their arbitrary signs. Indeed, in the case of all our general speculations, it is difficult to see in what other way our thoughts can be associated; for, I before endeavoured to shew, that, without the use of signs of one kind or another, it would be impossible for us to make classes or genera objects of our attention.

All the signs by which our thoughts are expressed, are addressed either to the eye or to the ear; and the impressions made on these organs, at the time when we first receive an idea, contribute to give us a firmer hold of it. Visible objects (as I observed in the Chapter on Conception) are remembered more easily than those of any of our other senses; and hence it is, that the bulk of mankind are more aided in their recollection by the impressions made on the eye, than by those made on the ear. Every person must have remarked, in studying the elements of geometry, how much his recollection of the theorems was aided by the diagrams which are connected with them: and I have little doubt, that the difficulty which students commonly find to remember the propositions of the fifth book of Euclid, arises chiefly from this, that the magnitudes to which they relate are represented by straight lines, which do not make so strong an impression on the memory, as the figures which illustrate the propositions in the other five books.

This advantage, which the objects of sight naturally have over those of hearing, in the distinctness and permanence of the impressions which they make on the memory, continues, and even increases, through life, in the case of the bulk of mankind; because their minds, being but little addicted to general and abstract disquisition, are habitually occupied, either with the immediate perception of such objects, or with speculations in which the conception of them is more or less involved; which speculations, so far as they relate to individual things and individual events, may be carried on with little or no assistance from language.

The case is different with the philosopher, whose habits of abstraction and generalization lay him continually under a necessity of employing words as an instrument of thought. Such habits cooperating with that inattention, which he is apt to contract to things external, must have an obvious tendency to weaken the original powers of recollection and conception with respect to visible objects; and, at the same time, to strengthen the power of retaining propositions and reasonings expressed in language. The common system of education, too, by exercising the memory so much in the acquisition of grammar rules, and of passages from the ancient authors, contributes greatly, in the case of men of letters, to cultivate a capacity for retaining words.

It is surprising of what a degree of culture our power of retaining a succession, even of insignificant sounds, is susceptible. Instances sometimes occur of men who are easily able to commit to memory a long poem, composed in a language of which they are wholly ignorant; and I have, myself, known more than one instance of an individual, who, after having forgotten completely the classical studies of his childhood, was yet able to repeat, with fluency, long passages from Homer and Virgil, without annexing an idea to the words that he uttered.

This susceptibility of memory with respect to words, is possessed by all men in a very remarkable degree in their early years, and is, indeed, necessary to enable them to acquire the use of language; but unless it be carefully cultivated afterwards by constant exercise, it gradually decays as we advance to maturity. The plan of education which is followed in this country, however imperfect in many respects, falls in happily with this arrangement of nature, and stores the mind richly, even in infancy, with intellectual treasures, which are to remain with it through life. The rules of grammar, which comprehend systems more or less perfect, of the principles of the dead languages, take a permanent hold of the memory, when the understanding is yet unable to comprehend their import; and the classical remains of antiquity, which, at the time we acquire them, do little more than furnish a gratification to the ear, supply us with inexhaustible sources of the most refined enjoyment; and, as our various powers gradually unfold themselves, are poured forth, without effort, from the memory, to delight the imagination, and to improve the heart. It cannot be doubted, that a great variety of other articles of useful knowledge, particularly with respect to geographical and chronological details, might be communicated with advantage to children, in the form of memorial lines. It is only in childhood, that such details can be learned with facility; and if they were once acquired, and rendered perfectly familiar to the mind, our riper years would be spared much of that painful and uninteresting labour, which is perpetually distracting our intellectual powers, from those more important exertions, for which, in their mature state, they seem to be destined.

This tendency of literary habits in general, and more particularly of philosophical pursuits, to exercise the thoughts about words, can scarcely fail to have some effect in weakening the powers of recollection and conception with respect to sensible objects; and, in fact, I believe it will be found, that whatever advantage the philosopher may possess over men of little education, in stating general propositions and general reasonings, he is commonly inferiour to them in point of minuteness and accuracy, when he attempts to describe any object which he has seen, or any event which he has witnessed; supposing the curiosity of both, in such cases, to be interested in an equal degree. I acknowledge, indeed, that the undivided attention, which men unaccustomed to reflection are able to give to the objects of their perceptions, is, in part, the cause of the liveliness and correctness of their conceptions.

With this diversity in the intellectual habits of cultivated and of uncultivated minds, there is another variety of memory which seems to have some connexion. In recognising visible objects, the memory of one man proceeds on the general appearance, that of another attaches itself to some minute and distinguishing marks. A peasant knows the various kinds of trees from their general habits; a botanist, from those characteristical circumstances on which his classification proceeds. The last kind of memory is, I think, most common among literary men, and it arises from their habit of recollecting by means of words. It is evidently much easier to express by a description, a number of botanical marks, than the general habit of a tree; and the same remark is applicable to other cases of a similar nature. But to whatever cause we ascribe it, there can be no doubt of the fact, that many individuals are to be found, and chiefly among men of letters, who, although they have no memory for the general appearances of objects, are yet able to retain with correctness, an immense number of technical discriminations.

Each of these kinds of memory has its peculiar advantages and inconveniences, which the dread of being tedious induces me to leave to the investigation of my readers.

SECTION III.

Of the Improvement of Memory.—Analysis of the Principles on which the Culture of Memory depends.

The improvement of which the mind is susceptible by culture, is more remarkable, perhaps, in the case of Memory, than in that of any other of our faculties. The fact has been often taken notice of in general terms; but I am doubtful if the particular mode, in which culture operates on this part of our constitution, has been yet examined by philosophers with the attention which it deserves.

Of one sort of culture, indeed, of which Memory is susceptible in a very striking degree, no explanation can be given; I mean the improvement which the original faculty acquires by mere exercise; or in other words, the tendency which practice has to increase our natural facility of association. This effect of practice upon the memory seems to be an ultimate law of our nature, or rather, to be a particular instance of that general law, that all our powers, both of body and mind, may be strengthened, by applying them to their proper purposes.

Besides, however, the improvement which memory admits of, in consequence of the effects of exercise on the original faculty, it may be greatly aided in its operations, by those expedients which reason and experience suggest for employing it to the best advantage. These expedients furnish a curious subject of philosophical examination: perhaps, too, the inquiry may not be altogether without use; for, although our principle resources for assisting the memory be suggested by nature, yet it is reasonable to think, that in this, as in similar cases, by following out systematically the hints which she suggests to us, a farther preparation may be made for our intellectual improvement.

Every person must have remarked, in entering upon any new species of study, the difficulty of treasuring up in the memory its elementary principles, and the growing facility which he acquires in this respect, as his knowledge becomes more extensive. By analyzing the different causes which concur in producing this facility, we may, perhaps, be led to some conclusions which may admit of a practical application.

1. In every science, the ideas about which it is peculiarly conversant are connected together by some particular associating principle; in one science, for example, by associations founded on the relation of cause and effect; in another, by associations founded on the relations of mathematical truths; in a third, by associations founded on contiguity in place or time. Hence one cause of the gradual improvement of memory with respect to the familiar objects of our knowledge; for whatever be the prevailing associating principle among the ideas about which we are habitually occupied, it must necessarily acquire additional strength from our favourite study.

2. In proportion as a science becomes more familiar to us, we acquire a greater command of attention with respect to the objects about which it is conversant; for the information which we already possess, gives us an interest in every new truth, and every new fact, which have any relation to it. In most cases, our habits of inattention may be traced to a want of curiosity; and therefore such habits are to be corrected, not by endeavouring to force the attention in particular instances, but by gradually learning to place the ideas which we wish to remember, in an interesting point of view.

3. When we first enter on any new literary pursuit, we are unable to make a proper discrimination in point of utility and importance, among the ideas which are presented to us; and by attempting to grasp at every thing, we fail in making those moderate acquisitions which are suited to the limited powers of the human mind. As our information extends, our selection becomes more judicious and more confined; and our knowledge of useful and connected truths advances rapidly, from our ceasing to distract the attention with such as are detached and insignificant.

4. Every object of our knowledge is related to a variety of others; and may be presented to the thoughts, sometimes by one principle of association, and sometimes by another. In proportion, therefore, to the multiplication of mutual relations among our ideas, (which is the natural result of growing information, and in particular, of habits of philosophical study,) the greater will be the number of occasions on which they will recur to the recollection, and the firmer will be the root which each idea, in particular, will take in the memory.

It follows, too, from this observation, that the facility of retaining a new fact, or a new idea, will depend on the number of relations which it bears to the former objects of our knowledge; and, on the other hand, that every such acquisition, so far from loading the memory, gives us a firmer hold of all that part of our previous information, with which it is in any degree connected.

It may not, perhaps, be improper to take this opportunity of observing, although the remark be not immediately connected with our present subject, that the accession made to the stock of our knowledge, by the new facts and ideas which we acquire, is not to be estimated merely by the number of these facts and ideas considered individually; but by the number of relations which they bear to another, and to all the different particulars which were previously in the mind; for, "new knowledge," (as Mr. Maclaurin has well remarked,*) "does not consist so much in our having access to a new object, as in comparing it with others already known, observing its relations to them, or discerning what it has in common with them, and wherein their disparity consists: and, therefore, our knowledge is vastly greater than the sum of what all its objects separately could afford; and when a new object comes within our reach, the addition to our knowledge is the greater, the more we already know; so that it increases, not as the new objects increase, but in a much higher proportion."

5. In the last place, the natural powers of memory are, in the case of the philosopher, greatly aided by his peculiar habits of classification and arrangement. As this is by far the most important improvement of which memory is susceptible, I shall consider it more particularly than any of the others I have mentioned.

The advantages, which the memory derives from a proper classification of our ideas, may be best conceived by attending to its effects, in enabling us to conduct, with ease, the common business of life. In what inextricable confusion would the lawyer or the merchant be immediately involved, if he were to deposit in his cabinet, promiscuously, the various written documents which daily and hourly pass through his hands? Nor could this confusion be prevented by the natural powers of memory, however vigorous they might happen to be. By a proper distribution of these documents, and a judicious reference of them to a few general titles, a very ordinary memory is enabled to accomplish more, than the most retentive, unassisted by method. We know, with certainty, where to find any article we may have occasion for, if it be in our possession; and the search is confined within reasonable limits, instead of being allowed to wander at random amidst a chaos of particulars.

Or, to take an instance still more immediately applicable to our purpose: suppose that a man of letters were to record, in a commonplace book, without any method, all the various ideas and facts which occurred to him in the course of his studies; what difficulties would he perpetually experience in applying his acquisitions to use? and how completely and easily might these difficulties be obviated by referring the particulars of his information to certain general heads? It is obvious, too, that, by doing so, he would not only have his knowledge much more completely under his command, but as the particulars classed together would all have some connexion, more or less, with each other, he would be enabled to trace with advantage those mutual relations among his ideas, which it is the object of philosophy to ascertain.

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* See the Conclusion of his View of NEWTON'S Discoveries.

A common-place book, conducted without any method, is an exact picture of the memory of man whose inquiries are not directed by philosophy. And the advantages of order in treasuring up our ideas in the mind, are perfectly analogous to its effects when they are recorded in writing.

Nor is this all. In order to retain our knowledge distinctly and permanently, it is necessary that we should frequently recall it to our recollection. But how can this be done without the aid of arrangement? Or supposing that it were possible, how much time and labour would be necessary for bringing under our review the various particulars of which our information is composed? In proportion as it is properly systematized, this time and labour are abridged. The mind dwells habitually, not on detached facts, but on a comparatively small number of general principles; and, by means of these, it can summon up, as occasions may require, an infinite number of particulars associated with them; each of which, considered as a solitary truth, would have been as burthensome to the memory, as the general principle with which it is connected.

I would not wish it to be understood from these observations, that philosophy consists in classification alone, and that its only use is to assist the memory. I have often, indeed, heard this asserted in general terms; but it appears to me to be obvious, that although this be one of its most important uses, yet something more is necessary to complete the definition of it. Were the case otherwise, it would follow, that all classifications are equally philosophical, provided they are equally comprehensive. The very great importance of this subject will, I hope, be a sufficient apology for me, in taking this opportunity to correct some mistaken opinions which have been formed concerning it.

SECTION IV.

Continuation of the same subject.—Aid which the Memory derives from Philosophical Arrangement.

It was before observed, that the great use of the faculty of Memory, is to enable us to treasure up, for the future regulation of our conduct, the results of our past experience, and of our past reflections. But in every case in which we judge of the future from the past, we must proceed on the belief, that there is, in the course of events, a certain degree, at least, of uniformity. And, accordingly, this belief is not only justified by experience, but, (as Dr. Reid has shewn, in a very satisfactory manner) it forms a part of the original constitution of the human mind. In the general laws of the material world, this uniformity is found to be complete; in so much that, in the same combinations of circumstances, we expect, with the most perfect assurance, that the same results will take place. In the moral world, the course of events does not appear to be equally regular; but still it is regular, to so great a degree, as to afford us many rules of importance in the conduct of life.

A knowledge of Nature, in so far as it is absolutely necessary for the preservation of our animal existence, is obtruded on us, without any reflection on our part, from our earliest infancy. It is thus that children learn of themselves to accommodate their conduct to the established laws of the material world. In doing so, they are guided merely by memory, and the instinctive principle of anticipation, which has just been mentioned.

In forming conclusions concerning future events, the philosopher, as well as the infant, can only build with safety on past experience; and he, too, as well as the infant, proceeds on an instinctive belief, for which he is unable to account, of the uniformity of the laws of nature. There are, however, two important respects, which distinguish the knowledge he possesses from that of ordinary men. In the first place, it is far more extensive, in consequence of the assistance which science gives to his natural powers of invention and discovery. Secondly, it is not only more easily retained in the memory, and more conveniently applied to use, in consequence of the manner in which his ideas are arranged; but it enables him to ascertain, by a process of reasoning, all those truths which may be synthetically deduced from his general principles. The illustration of these particulars will lead to some useful remarks; and will at the same time shew, that, in discussing the subject of this Section, I have not lost sight of the inquiry which occasioned it.

I. 1. It was already remarked, that the natural powers of Memory, together with that instinctive anticipation of the future from the past, which forms one of the original principles of the mind, are sufficient to enable infants, after a very short experience, to preserve their animal existence. The laws of nature, which it is not so important for us to know, and which are the objects of philosophical curiosity, are not so obviously exposed to our view, but are in general, brought to light by means of experiments which are made for the purpose of discovery; or, in other words, by artificial combinations of circumstances, which we have no opportunity of seeing conjoined in the course of our ordinary experience. In this manner, it is evident, that many connexions may be ascertained, which would never have occurred spontaneously to our observation.

2. There are, too, some instances, particularly in the case of astronomical phenomena, in which events, that appear to common observers to be altogether anomalous, are found, upon a more accurate

and continued examination of them, to be subjected to a regular law. Such are those phenomena in the heavens, which we are able to predict by means of Cycles. In the cases formerly described, our knowledge of nature is extended by placing her in new situations. In these cases, it is extended by continuing our observations beyond the limits of ordinary curiosity.

3. In the case of human affairs, as long as we confine our attention to particulars, we do not observe the same uniformity, as in the phenomena of the material world. When, however, we extend our views to events which depend on a combination of different circumstances, such a degree of uniformity appears, as enables us to establish general rules, from which probable conjectures may often be formed with respect to futurity. It is thus, that we can pronounce, with much greater confidence, concerning the proportion of deaths which shall happen in a certain period among a given number of men, than we can predict the death of any individual; and that it is more reasonable to employ our sagacity, in speculating concerning the probable determinations of a numerous society, than concerning events which depend on the will of a single person.

In what manner this uniformity in events depending on contingent circumstances is produced, I shall not inquire at present. The advantages which we derive from it are obvious, as it enables us to collect, from our past experience, many general rules, both with respect to the history of political societies, and the characters and conduct of men in private life.

4. In the last place; the knowledge of the philosopher is more extensive than that of other men, in consequence of the attention which he gives, not merely to objects and to events, but to the *relations* which different objects and different events bear to each other.

The observations and the experience of the vulgar are almost wholly limited to things perceived by the senses. A similarity between different objects, or between different events, rouses their curiosity, and leads them to classification, and to general rules. But a similarity between different *relations*, is seldom to be traced without previous habits of philosophical inquiry. Many such similarities or connexions, however, are to be found in nature; and when once they are ascertained, they frequently lead to important discoveries; not only with respect to other relations, but with respect to the objects or to the events which are related. These remarks it will be necessary to illustrate more particularly.

The great object of Geometry is to ascertain the relations which exist between different quantities, and the connexions which exist between different relations. When we demonstrate, that the angle at the centre of a circle is double of the angle at the circumference on the same base, we ascertain a relation between two quantities. When we demonstrate, that triangles of the same altitude are to each other as their bases, we ascertain a connexion between two relations. It is obvious, how much the mathematical sciences must contribute to enlarge our knowledge of the universe, in consequence of such discoveries. In that simplest of all processes of practical geometry, which teaches us to measure the height of an accessible tower, by comparing the length of its shadow with that of a staff fixed vertically in the ground, we proceed on the principle, that the relation between the shadow of the staff and the height of the staff is the same with the relation between the shadow of the tower and the height of the tower. But the former relation we can ascertain by actual measurement; and, of consequence, we not only obtain the other relation, but, as we can measure one of the related quantities, we obtain also the other quantity. In every case in which mathematics assists us in measuring the magnitudes or the distances of objects, it proceeds on the same principle; that is, it begins with ascertaining connexions among different relations, and thus enables us to carry our inquiries from facts which are exposed to the examination of our senses, to the most remote parts of the universe.

I observed also, that there are various relations existing among physical events, and various connexions existing among these relations. It is owing to this circumstance, that mathematics is so useful an instrument in the hands of the physical inquirer. In that beautiful theorem of Huyghens, which demonstrates, that the time of a complete oscillation of a pendulum in the cycloid, is to the time in which a body would fall through the axis of the cycloid, as the circumference of a circle is to its diameter, we are made acquainted with a very curious and unexpected connexion between two relations; and the knowledge of this connexion facilitates the determination of a most important fact with respect to the descent of heavy bodies near the earth's surface, which could not be ascertained conveniently by a direct experiment.

In examining, with attention, the relations among different physical events, and the connexions among different relations, we sometimes are led by mere induction to the discovery of a general law; while, to ordinary observers, nothing appears but irregularity. From the writings of the earlier opticians, we learn, that, in examining the first principles of dioptrics, they were led, by the analogy of the law of reflection, to search for the relation between the angles of incidence and refraction, (in the case of light passing from one medium into another,) in the angles themselves; and that some of them, finding this inquiry unsuccessful, took the trouble to determine, by experiments, (in the case of the media which most frequently fall under consideration,) the angle of refraction corresponding to every minute of incidence. Some very laborious tables, deduced from such experiments, are to be found in the works of Kircher. At length, Snellius discovered what is now called the law of refraction, which comprehends their whole contents in a single sentence.

The law of the planetary motions, deduced by Kepler from the observations of Tycho Brahe, is another striking illustration of the order, which an attentive inquirer is sometimes able to trace among the relations of physical events, when the events themselves appear, on a superficial view, to be perfectly anomalous.

Such laws are, in some respects, analogous to the cycles which I have already mentioned; but they differ from them in this, that a cycle is commonly deduced from observations made on physical events which are obvious to the senses: whereas the laws we have now been considering, are deduced from an examination of relations which are known only to men of science. The most celebrated astronomical cycles, accordingly, are of a very remote antiquity, and were probably discovered at a period, when the study of astronomy consisted merely in accumulating and recording the more striking appearances of the heavens.

II. Having now endeavoured to shew, how much philosophy contributes to extend our knowledge of facts, by aiding our natural powers of invention and discovery, I proceed to explain, in what manner it supersedes the necessity of studying particular truths, by putting us in possession of a comparatively small number of general principles in which they are involved.

I have already remarked the assistance which philosophy gives to the memory, in consequence of the arrangement it introduces among our ideas. In this respect even a hypothetical theory may facilitate the recollection of facts, in the same manner, in which the memory is aided in remembering the objects of natural history by artificial classifications.

The advantages, however, we derive from true philosophy, are incomparably greater than what are to be expected from any hypothetical theories. These, indeed, may assist us in recollecting the particulars we are already acquainted with; but it is only from the laws of nature, which have been traced analytically from facts, that we can venture, with safety, to deduce consequences by reasoning *a priori*. An example will illustrate and confirm this observation.

Suppose that a glass tube, thirty inches long, is filled with mercury, excepting eight inches, and is inverted as in the Torricellian experiment, so that the eight inches of common air may rise to the top; and that I wish to know at what height the mercury will remain suspended in the tube, the barometer being at that time twenty-eight inches high. There is here a combination of different laws, which it is necessary to attend to, in order to be able to predict the result. 1. The air is a heavy fluid, and the pressure of the atmosphere is measured by the column of mercury in the barometer. 2. The air is an elastic fluid; and its elasticity at the earth's surface (as it resists the pressure of the atmosphere) is measured by the column of mercury in the barometer. 3. In different states, the elastic force of the air is reciprocally as the spaces which it occupies. But, in this experiment, the mercury which remains suspended in the tube, together with the elastic force of the air in the top of the tube, is a counterbalance to the pressure of the atmosphere; and therefore their joint effect must be equal to the pressure of a column of mercury twenty-eight inches high. Hence we obtain an algebraical equation, which affords an easy solution of the problem. It is further evident, that my knowledge of the physical laws which are here combined, puts it in my power to foretell the result, not only in this case, but in all the cases of a similar nature which can be supposed. The problem, in any particular instance, might be solved by making the experiment; but the result would be of no use to me, if the slightest alteration were made on the data.

It is in this manner that philosophy, by putting us in possession of a few general facts, enables us to determine, by reasoning, what will be the result of any supposed combination of them, and thus to comprehend an infinite variety of particulars, which no memory, however vigorous, would have been able to retain.

In consequence of the knowledge of such general facts, the philosopher is relieved from the necessity of treasuring up in his mind all those truths which are involved in his principles, and which may be deduced from them by reasoning; and he can often prosecute his discoveries synthetically, in those parts of the universe which he has no access to examine by immediate observation. There is, therefore, this important difference between a hypothetical theory, and a theory obtained by induction; that the latter not only enables us to remember the facts we already know, but to ascertain, by reasoning, many facts which we have never had an opportunity of examining: whereas, when we reason from a hypothesis *a priori*, we are almost certain of running into error; and, consequently, whatever may be its use to the memory, it can never be trusted to, in judging of cases which have not previously fallen within our experience.

There are some sciences, in which hypothetical theories are more useful than in others; those sciences, to wit, in which we have occasion for an extensive knowledge and a ready recollection of facts, and which, at the same time, are yet in too imperfect a state to allow us to obtain just theories by the method of induction. This is particularly the case in the science of medicine, in which we are under a necessity to apply our knowledge, such as it is, to practice. It is also, in some degree, the case in agriculture. In the merely speculative parts of physics and chemistry, we may go on patiently accumulating facts, without forming any one conclusion farther than our facts authorize us; and leave to posterity the credit of establishing the theory to which our labours are subservient. But in medicine, in which it is of consequence to have our knowledge at command, it seems reasonable to think, that hypothetical theories may be used with advantage; provided always, that they are considered merely in the light of artificial memories, and that the student is prepared to lay them aside, or to correct them, in proportion as his knowledge of nature becomes more extensive. I am, indeed, ready to confess, that this is a caution which it is more easy to give than to follow: for it is painful to change any of our habits of arrangement, and to relinquish those systems in which we have been educated, and which have long flattered us with an idea of our own wisdom. Dr. Gregory mentions* it as a striking and distinguishing circumstance in the character of Sydenham, that, although full of hypothetical reasoning, it did not render him the less attentive to observation; and that his hypotheses seem to have sat so loosely about him, that either they did not influence his practice at all, or he could easily abandon them whenever they would not bend to his experience.

SECTION V.

Continuation of the same subject.—Effects produced on the Memory by committing to Writing our acquired Knowledge.

Having treated at considerable length of the improvement of memory, it may not be improper, before leaving this part of the subject, to consider what effects are likely to be produced on the mind by the practice of committing to writing our acquired knowledge. That such a practice is unfavourable, in some respects, to the faculty of memory, by superseding, to a certain degree, the necessity of its exertions, has been often remarked, and I believe is true; but the advantages with which it is attended in other respects, are so important, as to overbalance greatly this trifling inconvenience.

It is not my intention at present to examine and compare together the different methods which have been proposed of keeping a common-place book. In this, as in other cases of a similar kind, it may be difficult, perhaps, or impossible, to establish any rules which will apply universally. Individuals must be left to judge for themselves, and to adapt their contrivances to the particular nature of their literary pursuits, and to their own peculiar habits of association and arrangement. The remarks which I am to offer are very general, and are intended merely to illustrate a few of the advantages which the art of Writing affords to the philosopher, for recording, in the course of his progress through life, the results of his speculations, and the fruits of his experience.

The utility of writing, in enabling one generation to transmit its discoveries to another, and in thus giving rise to a gradual progress in the species, has been sufficiently illustrated by many authors. Little attention, however, has been paid to another of its effects, which is no less important; I mean, to the foundation which it lays for a perpetual progress in the intellectual powers of the individual.

It is to experience, and to our own reflections, that we are indebted for by far the most valuable part of our knowledge: and hence it is, that although in youth the imagination may be more vigorous, and the genius more original, than in advanced years; yet, in the case of a man of observation and inquiry, the judgment may be expected, at least as long as his faculties remain in perfection, to become every day sounder and more enlightened. It is, however, only by the constant practice of writing, that the results of our experience, and the progress of our ideas, can be accurately recorded. If they are trusted merely to the memory, they will gradually vanish from it like a dream, or will come in time to be so blended with the suggestions of imagination, that we shall not be able to reason from them with any degree of confidence. What improvements in science might we not flatter ourselves with the hopes of accomplishing, had we only activity and industry to treasure up every plausible hint that occurs to us! Hardly a day passes, when many such do not occur to ourselves, or are suggested by others; and detached and insulated as they may appear at present, some of them may perhaps afterwards, at the distance of years, furnish the key-stone of an important system.

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* Lectures on the Duties and Qualifications of a Physician.

But it is not only in this point of view that the philosopher derives advantage from the practice of writing. Without its assistance, he could seldom be able to advance beyond those simple elementary truths which are current in the world, and which form, in the various branches of science, the established creed of the age he lives in. How inconsiderable would have been the progress of mathematicians, in their more abstruse speculations, without the aid of the algebraical notation; and to what sublime discoveries have they been led by this beautiful contrivance, which, by relieving the memory of the effort necessary for recollecting the steps of a long investigation, has enabled them to prosecute an infinite variety of inquiries, to which the unassisted powers of the human mind would have been altogether unequal! In the other sciences, it is true, we have seldom or never occasion to follow out such long chains of consequences as in mathematics; but in these sciences, if the chain of investigation be shorter, it is far more difficult to make the transition from one link to another; and it is only by dwelling long on our ideas, and rendering them perfectly familiar to us, that such transitions can, in most instances, be made with safety. In morals and politics, when we advance a step beyond those elementary truths which are daily presented to us in books or conversation, there is no method of rendering our conclusions familiar to us, but by committing them to writing, and making them frequently the subjects of our meditation. When we have once done so, these conclusions become elementary truths with respect to us; and we may advance from them with confidence to others which are more remote, and which are far beyond the reach of vulgar discovery. By following such a plan, we can hardly fail to have our industry rewarded in due time by some important improvement; and it is only by such a plan that we can reasonably hope to extend considerably the boundaries of human knowledge. I do not say that these habits of study are equally favourable to brilliancy of conversation. On the contrary, I believe that those men who possess this accomplishment in the highest degree, are such as do not advance beyond elementary truths; or rather, perhaps, who advance only a single step beyond them; that is, who think a little more deeply than the vulgar, but whose conclusions are not so far removed from common opinions, as to render it necessary for them, when called upon to defend them, to exhaust the patience of their hearers, by stating a long train of intermediate ideas. They who have pushed their inquiries much farther than the common systems of their times, and have rendered familiar to their own minds the intermediate steps by which they have been led to their conclusions, are too apt to conceive other men to be in the same situation with themselves; and when they mean to instruct, are mortified to find that they are only regarded as paradoxical and visionary. It is but rarely we find a man of very splendid and various conversation to be possessed of a profound judgment, or of great originality of genius.

Nor is it merely to the philosopher, who wishes to distinguish himself by his discoveries, that writing affords an useful instrument of study. Important assistance may be derived from it by all those who wish to impress on their minds the investigations which occur to them in the course of their reading; for although writing may weaken (as I already acknowledged it does) a memory for detached observations, or for insulated facts, it will be found the only effectual method of fixing in it permanently those acquisitions, which involve long processes of reasoning.

When we are employed in inquiries of our own, the conclusions which we form make a much deeper and more lasting impression on the memory, than any knowledge which we imbibe passively from another. This is undoubtedly owing, in part, to the effect which the ardour of discovery has in rousing the activity of the mind, and in fixing its attention; but I apprehend it is chiefly to be ascribed to this, that when we follow out a train of thinking of our own, our ideas are arranged in that order which is most agreeable to our prevailing habits of association. The only method of putting our acquired knowledge on a level, in this respect, with our original speculations, is, after making ourselves acquainted with our author's ideas, to study the subject over again in our own way; to pause, from time to time, in the course of our reading, in order to consider what we have gained; to recollect what the propositions are, which the author wishes to establish, and to examine the different proofs which he employs to support them. In making such an experiment, we commonly find, that the different steps of the process arrange themselves in our minds, in a manner different from that in which the author has stated them; and that, while his argument seems, in some places, obscure, from its conciseness, it is tedious in others, from being unnecessarily expanded. When we have reduced the reasoning to that form, which appears to ourselves to be the most natural and satisfactory, we may conclude with certainty, not that this form is better in itself than another, but that it is the best adapted to our memory. Such reasonings, therefore, as we have occasion frequently to apply, either in the business of life, or in the course of our studies, it is of importance to us to commit to writing, in a language and in an order of our own; and if, at any time, we find it necessary to refresh our recollection on the subject, to have recourse to our own composition, in preference to that of any other author.

That the plan of reading which is commonly followed is very different from that which I have been recommending, will not be disputed. Most people read merely to pass an idle hour, or to please themselves with the idea of employment, while their indolence prevents them from any active exertion; and a considerable number with a view to the display which they are afterwards to make of their literary acquisitions. From which so ever of these motives a person is led to the perusal of books, it is hardly possible that he can derive from them any material advantage. If he reads merely from indolence, the ideas which pass through his mind will probably leave little or no impression; and if he reads from vanity, he will be more anxious to select striking particulars in the matter or expression, than to seize the spirit and scope of the author's reasoning, or to examine how far he has made any additions to the stock of useful and solid knowledge. "Though it is scarce possible," says Bp. Butler,* "to avoid judging, in some way or other, of almost "every thing which offers itself to one's thoughts, yet it is certain, "that many persons, from different causes, never exercise their "judgment upon what comes before them, in such a manner as to "be able to determine how far it be conclusive. They are perhaps "entertained with some things, not so with others; they like, and "they dislike; but whether that which is proposed to be made out, "be really made out or not, whether a matter be stated according "to the real truth of the case, seems, to the generality of people, "a circumstance of little or no importance. Arguments are often "wanted for some accidental purpose; but proof, as such, is what "they never want, for their own satisfaction of mind, or conduct in "life. Not to mention the multitudes who read merely for the sake "of talking, or to qualify themselves for the world, or some such "kind of reasons; there are even of the few who read for their own "entertainment, and have a real curiosity to see what is said, several, which is astonishing, who have no sort of curiosity to see "what is true: I say curiosity, because it is too obvious to be mentioned how much that religious and sacred attention which is due "to truth, and to the important question, what is the rule of life, is "lost out of the world.

"For the sake of this whole class of readers, for they are of different capacities, different kinds, and get into this way from different occasions, I have often wished that it had been the custom to "lay before people nothing in matters of argument but premises,

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* See the Preface to his Sermons.

"and leave them to draw conclusions themselves; which, although, "it could not be done in all cases, might in many.

"The great number of books and papers of amusement, which, "of one kind or another, daily come in one's way, have in part "occasioned, and most perfectly fall in with and humour this idle "way of reading and considering things. By this means, time, even "in solitude, is happily got rid of without the pain of attention; "neither is any part of it more put to the account of idleness, one "can scarce forbear saying, is spent with less thought, than great "part of that which is spent in reading."

If the plan of study which I formerly described were adopted, it would undoubtedly diminish very much the number of books which it would be possible to turn over; but I am convinced that it would add greatly to the stock of useful and solid knowledge; and by rendering our acquired ideas in some measure our own, would give us a more ready and practical command of them: not to mention, that if we are possessed of any inventive powers, such exercises would continually furnish them with an opportunity of displaying themselves upon all the different subjects which may pass under our review.

Nothing, in truth, has such a tendency to weaken, not only the powers of invention, but the intellectual powers in general, as a habit of extensive and various reading, without reflection. The activity and force of the mind are gradually impaired, in consequence of disuse; and not unfrequently all our principles and opinions come to be lost in the infinite multiplicity and discordancy of our acquired ideas.

By confining our ambition to pursue the truth with modesty and candour, and learning to value our acquisitions only as far as they contribute to make us wiser and happier, we may perhaps be obliged to sacrifice the temporary admiration of the common dispensers of literary fame; but we may rest assured, that it is in this way only we can hope to make real progress in knowledge, or to enrich the world with useful inventions.

"It requires courage, indeed," (as Helvetius has remarked,) "to "remain ignorant of those useless subjects which are generally "valued;" but it is a courage necessary to men who either love the truth, or who aspire to establish a permanent reputation.

SECTION VI.

Continuation of the same Subject.—Of Artificial Memory.

By an Artificial Memory is meant, a method of connecting in the mind, things difficult to be remembered, with things easily remembered; so as to enable it to retain, and to recollect the former, by means of the latter. For this purpose, various contrivances have been proposed, but I think the foregoing definition applies to all of them.

Some sorts of artificial memory are intended to assist the natural powers of the human mind on particular occasions which require a more than ordinary effort of recollection; for example, to assist a public speaker to recollect the arrangement of a long discourse.

Others have been devised with a view to enable us to extend the circle of our acquired knowledge, and to give us a more ready command of all the various particulars of our information.

The topical Memory, so much celebrated among the ancient rhetoricians, comes under the former description.

I already remarked the effect of sensible objects, in recalling to the mind the ideas with which it happened to be occupied, at the time when these objects were formerly perceived. In travelling along a road, the sight of the more remarkable scenes we meet with, frequently puts us in mind of the subjects we were thinking or talking of when we last saw them. Such facts, which are perfectly familiar even to the vulgar, might very naturally suggest the possibility of assisting the memory, by establishing a connexion between the ideas we wish to remember, and certain sensible objects, which have been found from experience to make a permanent impression on the mind.* I have been told of a young woman, in a very low rank in life, who contrived a method of committing to memory the sermons which she was accustomed to hear, by fixing her attention, during the different heads of the discourse, on different compartments of the roof of the church; in such a manner, as that, when she afterwards saw the roof, or recollected the order in which its compartments were disposed, she recollected the method which the preacher had observed in treating his subject. This contrivance was perfectly analogous to the topical memory of the ancients; an art which, whatever be the opinion we entertain of its use, is certainly entitled, in a high degree, to the praise of ingenuity.

Suppose that I were to fix in my memory the different apartments in some very large building, and that I had accustomed myself to think of these apartments always in the same invariable order. Suppose farther, that, in preparing myself for a public discourse, in which I had occasion to treat of a great variety of particulars, I was anxious to fix in my memory the order I proposed to observe in the communication of my ideas. It is evident, that by a proper division of my subject into heads, and by connecting each head with a particular apartment, (which I could easily do, by conceiving myself to be sitting in the apartment while I was studying the part of my discourse I meant to connect with it,) the habitual order in which these apartments occurred to my thoughts, would present to me, in their proper arrangement, and without any effort on my part, the ideas of which I was to treat. It is also obvious, that a very little practice would enable me to avail myself of this contrivance, without any embarrassment or distraction of my attention.*

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* "Cum in loca aliqua post tempus reversi sumus, non ipsa agnoscimus tantum, sed etiam, quae in his fecerimus, reminiscimur, personaeque subeunt, nonnunquam tacitae quoque cogitationes in mentem revertuntur. Nata est igitur, ut in plerisque, ars ab experimento."
QUINCT. *Inst. Orat.* lib. xi. cap. 2.

As to the utility of this art, it appears to me to depend entirely on the particular object which we suppose the speaker to have in view; whether, as was too often the case with the ancient rhetoricians, to bewilder a judge, and to silence an adversary; or fairly and candidly to lead an audience to the truth. On the former supposition, nothing can possibly give an orator a greater superiority, than the possession of a secret, which, while it enables him to express himself with facility and the appearance of method, puts it in his power, at the same time, to dispose his arguments and his facts, in whatever order he judges to be the most proper to mislead the judgment, and to perplex the memory, of those whom he addresses. And such, it is manifest, is the effect, not only of the topical memory of the ancients, but of all other contrivances which aid the recollection, upon any principle different from the natural and logical arrangement of our ideas.

To those on the other hand, who speak with a view to convince or to inform others, it is of consequence that the topics which they mean to illustrate, should be arranged in an order equally favourable to their own recollection and to that of their hearers. For this purpose, nothing is effectual, but that method which is suggested by the order of their own investigations; a method which leads the mind from one idea to another, either by means of obvious and striking associations, or by those relations which connect the different steps of a clear and accurate process of reasoning. It is thus only that the attention of an audience can be completely and incessantly engaged, and that the substance of a long discourse can be remembered without effort. And it is thus only that a speaker, after a mature consideration of his subject, can possess a just confidence in his own powers of recollection, in stating all the different premises which lead to the conclusion he wishes to establish.

In modern times, such contrivances have been very little, if at all, made use of by public speakers; but various ingenious attempts have been made, to assist the memory, in acquiring and retaining those branches of knowledge which it has been supposed necessary for a scholar to carry always about with him; and which, at the same time, from the number of particular details which they involve, are not calculated, of themselves, to make a very lasting impression on the mind. Of this sort is the Memoria Technica of Mr. Grey, in which a great deal of historical, chronological, and geographical knowledge is comprised in a set of verses, which the student is supposed to make as familiar to himself as school-boys do the rules of grammar. These verses are, in general, a mere assemblage of proper names, disposed in a rude sort of measure; some slight alterations being occasionally made on the final syllables of the words, so as to be significant (according to certain principles laid down in the beginning of the work) of important dates, or of other particulars which it appeared to the author useful to associate with the names.

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* In so far as it was the object of this species of artificial memory to assist an orator in recollecting the plan and arrangement of his discourse, the accounts of it which are given by the ancient rhetoricians are abundantly satisfactory. It appears, however, that its use was more extensive; and that it was so contrived, as to facilitate the recollection of a premeditated composition. In what manner this was done, it is not easy to conjecture from the imperfect explanations of the art which have been transmitted to modern times. The reader may consult CICERO *de Orat.* lib ii. cap. 87, 88. *Rhetor. ad Herennium*, lib. iii. cap. 16. et seq.—QUINCTIL. *Inst. Orat.* lib. xi. cap. 2.

I have heard very opposite opinions with respect to the utility of this ingenious system. The prevailing opinion is, I believe, against it; although it has been mentioned in terms of high approbation by some writers of eminence. Dr. Priestley, whose judgment in matters of this sort is certainly entitled to respect, has said, that "it is "a method so easily learned, and which may be of so much use in "recollecting dates, when other methods are not at hand, that he "thinks all persons of a liberal education inexcusable, who will not "take the small degree of pains that is necessary to make themselves masters of it; or who think any thing mean, or unworthy "of their notice, which is so useful and convenient."*

In judging of the utility of this, or of any other contrivance of the same kind, to a particular person, a great deal must depend on the species of memory which he has received from nature, or has acquired in the course of his early education. Some men, (as I already remarked,) especially among those who have been habitually exercised in childhood in getting by heart grammar rules) have an extraordinary facility in acquiring and retaining the most barbarous and the most insignificant verses; which another person would find as difficult to remember, as the geographical and chronological details of which it is the object of this art to relieve the memory. Allowing, therefore, the general utility of the art, no one method, perhaps, is entitled to an exclusive preference; as one contrivance may be best suited to the faculties of one person, and a very different one to those of another.

One important objection applies to all of them, that they accustom the mind to associate ideas by accidental and arbitrary connexions; and, therefore, how much soever they may contribute, in the course of conversation, to an ostentatious display of acquired knowledge, they are, perhaps, of little real service to us, when we are seriously engaged in the pursuit of truth. I own, too, I am very doubtful with respect to the utility of a great part of that information which they are commonly employed to impress on the memory, and on which the generality of learned men are disposed to value themselves. It certainly is of no use, but in so far as it is subservient to the gratification of their vanity; and the acquisition of it consumes a great deal of time and attention, which might have been employed in extending the boundaries of human knowledge. To those, however, who are of a different opinion, such contrivances as Mr. Grey's may be extremely useful: and to all men they may be of service, in fixing in the memory those insulated and uninteresting particulars, which it is either necessary for them to be acquainted with, from their situation; or which custom has rendered, in the common opinion, essential branches of a liberal education. I would, in particular, recommend this author's method of recollecting dates, by substituting letters for the numeral cyphers; and forming these letters into words, and the words into verses. I have found it, at least, in my own case, the most effectual of all such contrivances of which I have had experience.

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* Lectures on History, p. 157.

SECTION VII.

Continuation of the same Subject.—Importance of making a proper Selection among the Objects of our Knowledge, in order to derive Advantage from the Acquisitions of Memory.

The cultivation of Memory, with all the helps that we can derive to it from art, will be of little use to us, unless we make a proper selection of the particulars to be remembered. Such a selection is necessary to enable us to profit by reading; and still more so, to enable us to profit by observation, to which every man is indebted for by far the most valuable part of his knowledge.

When we first enter on any new literary pursuit, we commonly find our efforts of attention painful and unsatisfactory. We have no discrimination in our curiosity, and by grasping at every thing, we fail in making those moderate acquisitions which are suited to our limited faculties. As our knowledge extends, we learn to know what particulars are likely to be of use to us, and acquire a habit of directing our examination to these, without distracting the attention with others. It is partly owing to a similar circumstance, that most readers complain of a defect of memory, when they first enter on the study of history. They cannot separate important from trifling facts, and find themselves unable to retain any thing, from their anxiety to secure the whole.

In order to give a proper direction to our attention in the course of our studies, it is useful, before engaging in particular pursuits, to acquire as familiar an acquaintance as possible with the great outlines of the different branches of science; with the most important conclusions which have hitherto been formed in them, and with the most important desiderata which remain to be supplied. In the case too of those parts of knowledge, which are not yet ripe for the formation of philosophical systems, it may be of use to study the various hypothetical theories which have been proposed for connecting together and arranging the phenomena. By such general views alone we can prevent ourselves from being lost amidst a labyrinth of particulars, or can engage in a course of extensive and various reading, with an enlightened and discriminating attention. While they withdraw our notice from barren and insulated facts, they direct it to such as tend to illustrate principles which have either been already established, or which, from having that degree of connexion among themselves, which is necessary to give plausibility to a hypothetical theory, are likely to furnish, in time, the materials of a juster system.

Some of the followers of Lord Bacon have, I think, been led, in their zeal for the method of induction, to censure hypothetical theories with too great a degree of severity. Such theories have certainly been frequently of use, in putting philosophers upon the road of discovery. Indeed, it has probably been in this way, that most discoveries have been made; for although a knowledge of facts must be prior to the formation of a just theory, yet a hypothetical theory is generally our best guide to the knowledge of useful facts. If a man, without forming to himself any conjecture concerning the unknown laws of nature, were to set himself merely to accumulate facts at random, he might, perhaps, stumble upon some important discovery; but by far the greater part of his labours would be wholly useless. Every philosophical inquirer, before he begins a set of experiments, has some general principle in his view, which he suspects to be a law of nature:* and although his conjectures may be often wrong, yet they serve to give his inquiries a particular direction, and to bring under his eye a number of facts which have a certain relation to each other. It has been often remarked that the attempts to discover the philosopher's stone, and the quadrature of the circle, have led to many useful discoveries in chemistry and mathematics. And they have plainly done so, merely by limiting the field of observation and inquiry, and checking that indiscriminate and desultory attention which is so natural to an indolent mind. A hypothetical theory, however erroneous, may answer a similar purpose. "Prudens interrogatio," (says Lord Bacon,) "est dimi-"dium scientiæ. Vaga enim experientia et se tantum sequens mera "palpatio est, et homines potius stupefacit quam informat." What, indeed, are Newton's queries, but so many hypotheses which are proposed as subjects of examination to philosophers? And did not even the great doctrine of gravitation take its first rise from a fortunate conjecture?

While, therefore, we maintain, with the followers of Bacon, that no theory is to be admitted as proved, any farther than it is supported by facts, we should, at the same time, acknowledge our obligations to those writers who hazard their conjectures to the world with modesty and diffidence. And it may not be improper to add, that men of a systematizing turn are not now so useless as formerly;

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* "Recte siquidem Plato, 'Qui aliquid quaerit, id ipsum, quod quaerit, generali quadam notione comprehendit: aliter, qui fieri potest, ut illud, cum fuerit inventum, agnoscat?' Idcirco quo amplior et certior fuerit anticipatio nostra; eo magis directa et compendiosa erit investigatio."—*De Aug. Scient.* lib. v. cap. 3.

for we are already possessed of a great stock of facts: and there is scarcely any theory so bad as not to bring together a number of particulars which have a certain degree of relation or analogy to each other.

The foregoing remarks are applicable to all our various studies; whether they are conducted in the way of reading, or of observation. From neither of these two sources of information can we hope to derive much advantage, unless we have some general principles to direct our attention to proper objects.

With respect to observation, some farther cautions may be useful; for in guarding against an indiscriminate accumulation of particulars, it is possible to fall into the opposite extreme, and to acquire a habit of inattention to the phenomena which present themselves to our senses. The former is the error of men of little education; the latter is more common among men of retirement and study.

One of the chief effects of a liberal education, is to enable us to withdraw the attention from the present objects of our perceptions, and to dwell at pleasure on the past, the absent, or the future. But when we are led to carry these efforts to an excess, either from a warm and romantic imagination, or from an anxious and sanguine temper, it is easy to see that the power of observation is likely to be weakened, and habits of inattention to be contracted. —The same effect may be produced by too early an indulgence in philosophical pursuits, before the mind has been prepared for the study of general truths by exercising its faculties among particular objects, and particular occurrences. In this way, it contracts an aversion to the examination of details, from the pleasure which it has experienced in the contemplation or in the discovery of general principles. Both of these turns of thought, however, presuppose a certain degree of observation; for the materials of imagination are supplied by the senses; and the general truths which occupy the philosopher would be wholly unintelligible to him, if he was a total stranger to all experience with respect to the course of nature and of human life. The observations, indeed, which are made by men of a warm imagination, are likely to be inaccurate and fallacious, and those of the speculative philosopher are frequently carried no farther than is necessary to enable him to comprehend the terms which relate to the subjects of his reasoning; but both the one and the other must have looked abroad occasionally at nature, and at the world; if not to ascertain facts by actual examination, at least to store their minds with ideas.

The metaphysician, whose attention is directed to the faculties and operations of the mind, is the only man who possesses within himself the materials of his speculations and reasonings. It is accordingly among this class of literary men, that habits of inattention to things external have been carried to the greatest extreme.

It is observed by Dr. Reid, that the power of reflection, (by which he means the power of attending to the subjects of our consciousness,) is the last of our intellectual faculties which unfolds itself: and that in the greater part of mankind it never unfolds itself at all. It is a power, indeed, which being subservient merely to the gratification of metaphysical curiosity, it is not essentially necessary for us to possess, in any considerable degree. The power of observation, on the other hand, which is necessary for the preservation even of our animal existence, discovers itself in infants long before they attain the use of speech; or rather, I should have said, as soon as they come into the world: and where nature is allowed free scope, it continues active and vigorous through life. It was plainly the intention of nature, that in infancy and youth it should occupy the mind almost exclusively, and that we should acquire all our necessary information before engaging in speculations which are less essential, and accordingly this is the history of the intellectual progress, in by far the greater number of individuals. In consequence of this, the difficulty of metaphysical researches is undoubtedly much increased; for the mind being constantly occupied in the earlier part of life about the properties and laws of matter, acquires habits of inattention to the subjects of consciousness, which are not to be surmounted, without a degree of patience and perseverance of which few men are capable: but the inconvenience would evidently have been greatly increased, if the order of nature had, in this respect, been reversed, and if the curiosity had been excited at as early a period, by the phenomena of the intellectual world, as by those of the material. Of what would have happened on this supposition, we may form a judgment from those men who, in consequence of an excessive indulgence in metaphysical pursuits, have weakened, to an unnatural degree, their capacity of attending to external objects and occurrences. Few metaphysicians, perhaps, are to be found, who are not deficient in the power of observation: for, although a taste for such abstract speculations is far from being common, it is more apt, perhaps, than any other, when it has once been formed, to take an exclusive hold of the mind, and to shut up the other sources of intellectual improvement. As the metaphysician carries within himself the materials of his reasoning, he is not under a necessity of looking abroad for subjects of speculation or amusement; and unless he be very careful to guard against the effects of his favourite pursuits, he is in more danger than literary men of any other denomination, to lose all interest about the common and proper objects of human curiosity.

To prevent any danger from this quarter, I apprehend that the study of the mind should form the last branch of the education of youth; an order which nature herself seems to point out, by what I have already remarked, with respect to the development of our faculties. After the understanding is well stored with particular facts, has been conversant with particular scientific pursuits, it will be enabled to speculate concerning its own powers with additional advantage, and will run no hazard of indulging too far in such inquiries. Nothing can be more absurd, on this as well as on many other accounts, than the common practice, which is followed in our universities, of beginning a course of philosophical education with the study of logic. If this order were completely reversed, and if the study of logic were delayed till after the mind of the student was well stored with particular facts in physics, in chemistry, in natural and civil history, his attention might be led with the most important advantage, and without any danger to his power of observation, to an examination of his own faculties; which, besides opening to him a new and pleasing field of speculation, would enable him to form an estimate of his own powers, of the acquisitions he has made, of the habits he has formed, and of the farther improvements of which his mind is susceptible.

In general, wherever habits of inattention, and an incapacity of observation, are very remarkable, they will be found to have arisen from some defect in early education. I have already remarked, that, when nature is allowed free scope, curiosity, during early youth, is alive to every external object, and to every external occurrence, while the powers of imagination and reflection do not display themselves till a much later period; the former till about the age of puberty, and the latter till we approach to manhood. It sometimes, however, happens that, in consequence of a peculiar disposition of mind, or of an infirm bodily constitution, a child is led to seek amusement from books, and to loose a relish for those recreations which are suited to his age. In such instances, the ordinary progress of the intellectual powers is prematurely quickened; but that best of all educations is lost, which nature has prepared both for the philosopher and the man of the world, amidst the active sports and the hazardous adventures of childhood. It is from these alone that we can acquire, not only that force of character which is suited to the more arduous situations of life, but that complete and prompt command of attention to things external, without which the highest endowments of the understanding, however they may fit a man for the solitary speculations of the closet, are but of little use in the practice of affairs, or for enabling him to profit by his personal experience.

Where, however, such habits of inattention have unfortunately been contracted, we ought not to despair of them as perfectly incurable. The attention, indeed, as I formerly remarked, can seldom be forced in particular instances; but we may gradually learn to place the objects we wish to attend to, in lights more interesting than those in which we have been accustomed to view them. Much may be expected from a change of scene, and a change of pursuits; but above all, much may be expected from foreign travel. The objects which we meet will excite our surprise by their novelty; and in this manner we not only gradually acquire the power of observing and examining them with attention, but, from the effects of contrast, the curiosity comes to be roused with respect to the corresponding objects in our own country, which, from our early familiarity with them, we had formerly been accustomed to overlook. In this respect, the effects of foreign travel, in directing the attention to familiar objects and occurrences, is somewhat analogous to that which the study of a dead or a foreign language produces, in leading the curiosity to examine the grammatical structure of our own.

Considerable advantage may also be derived, in overcoming the habits of inattention, which we may have contracted to particular subjects, from studying the systems, true or false, which philosophers have proposed for explaining or for arranging the facts connected with them. By means of these systems, not only is the curiosity circumscribed and directed, instead of being allowed to wander at random, but, in consequence of our being enabled to connect facts with general principles, it becomes interested in the examination of those particulars which would otherwise have escaped our notice.

SECTION VIII.

Of the Connexion between Memory and philosophical Genius.

It is commonly supposed, that genius is seldom united with a very tenacious memory. So far, however, as my own observation has reached, I can scarcely recollect one person who possesses the former of these qualities, without a more than ordinary share of the latter.

On a superficial view of the subject, indeed, the common opinion has some appearance of truth; for, we are naturally led, in consequence of the topics about which conversation is usually employed, to estimate the extent of memory, by the impression which trivial occurrences make upon it, and these in general escape the recollection of a man of ability, not because he is unable to retain them, but because he does not attend to them. It is probable, likewise, that accidental associations, founded on contiguity in time and place, may make but a slight impression on his mind. But it does not therefore follow, that his stock of facts is small. They are connected together in his memory by principles of association, different from those which prevail in ordinary minds; and they are on that very account the more useful: for as the associations are founded upon real connexions among the ideas, (although they may be less conducive to the fluency, and perhaps to the wit of conversation,) they are of incomparably greater use in suggesting facts which are to serve as a foundation for reasoning or for invention.

It frequently happens, too, that a man of genius, in consequence of a peculiarly strong attachment to a particular subject, may first feel a want of inclination, and may afterwards acquire a want of capacity, of attending to common occurrences. But it is probable that the whole stock of ideas in his mind, is not inferiour to that of other men; and that however unprofitably he may have directed his curiosity, the ignorance which he discovers on ordinary subjects does not arise from a want of memory, but from a peculiarity in the selection which he has made of the objects of his study.

Montaigne* frequently complains in his writings of his want of memory: and he indeed gives many very extraordinary instances of his ignorance on some of the most ordinary topics of information. But it is obvious to any person who reads his works with attention, that this ignorance did not proceed from an original defect of memory, but from the singular and whimsical direction which his curiosity had taken at an early period of life. "I can do nothing," says he, "without my memorandum book; and so great is my difficulty in remembering proper names, that I am forced to call my domestic servants by their offices. I am ignorant of the greater part of our coins in use; of the difference of one grain from another, both in the earth and in the granary; what use leaven is of in making bread, and why wine must stand some time in the vat before it ferments." Yet the same author appears evidently, from his writings, to have had his memory stored with an infinite variety of apothegms, and of historical passages, which had struck his imagination; and to have been familiarly acquainted, not only with the names, but with the absurd and exploded opinions of the ancient philosophers; with the ideas of Plato, the atoms of Epicurus, the plenum and vacuum of Leucippus and Democritus, the water of Thales, the numbers of Pythagoras, the infinite of Parmenides, and the unity of Musæus. In complaining too of his want of presence of mind, he indirectly acknowledges a degree of memory which, if it had been judiciously employed, would have been more than sufficient for the acquisition of all those common branches of knowledge in which he appears to have been deficient. "When I have an oration to speak," says he, "of any considerable length, I am reduced to the miserable necessity of getting it, word for word, by heart"

The strange and apparently inconsistent combination of knowledge and ignorance which the writings of Montaigne exhibit, led Malebranche (who seems to have formed too low an opinion both of his genius and character) to tax him with affectation; and even to call in question the credibility of some of his assertions. But no one who is well acquainted with this most amusing author, can reasonably suspect his veracity; and, in the present instance, I can give him complete credit, not only from my general opinion of his sincerity, but from having observed, in the course of my own experience, more than one example of the same sort of combination; not indeed carried to such a length as Montaigne describes, but bearing a striking resemblance to it.

The observations which have already been made, account, in part, for the origin of the common opinion, that genius and memory are seldom united in great degrees in the same person; and at the same

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[*] Il n'est homme à qui il siese si mal de se mesler de parler de memoire. Car je n'en recognoy quasi trace en moy; et ne pense qu'il y en ait au monde une autre si marveilleuse en defaillance. *Essais de* MONTAIGNE, liv. i. ch. 9.

time shew, that some of the facts on which that opinion is founded, do not justify such a conclusion. Besides these, however, there are other circumstances, which at first view, seem rather to indicate an inconsistency between extensive memory and original genius.

The species of memory which excites the greatest degree of admiration in the ordinary intercourse of society, is a memory for detached and insulated facts; and it is certain that those men who are possessed of it, are very seldom distinguished by the higher gifts of the mind. Such a species of memory is unfavourable to philosophical arrangement, because it in part supplies the place of arrangement. One great use of philosophy, as I already shewed, is to give us an extensive command of particular truths, by furnishing us with general principles, under which a number of such truths is comprehended. A person in whose mind casual associations of time and place make a lasting impression, has not the same inducements to philosophize, with others, who connect facts together chiefly by the relations of cause and effect, or of premises and conclusion. I have heard it observed, that those men who have risen to the greatest eminence in the profession of law, have been in general such as had, at first, an aversion to the study. The reason probably is, that to a mind fond of general principles, every study must be at first disgusting, which presents to it a chaos of facts apparently unconnected with each other. But this love of arrangement, if united with persevering industry, will at last conquer every difficulty; will introduce order into what seemed on a superficial view, a mass of confusion, and reduce the dry and uninteresting detail of positive statutes into a system comparatively luminous and beautiful.

The observation, I believe, may be made more general, and may be applied to every science in which there is a great multiplicity of facts to be remembered. A man destitute of genius may, with little effort, treasure up in his memory a number of particulars in chemistry or natural history, which he refers to no principle, and from which he deduces no conclusion; and from his facility in acquiring this stock of information, may flatter himself with the belief that he possesses a natural taste for these branches of knowledge. But they who are really destined to extend the boundaries of science, when they first enter on new pursuits, feel their attention distracted, and their memory overloaded with facts among which they can trace no relation, and are sometimes apt to despair entirely of their future progress. In due time, however, their superiority appears, and arises in part from that very dissatisfaction which they at first experienced, and which does not cease to stimulate their inquiries, till they are enabled to trace, amidst a chaos of apparently unconnected materials, that simplicity and beauty which always characterize the operations of nature.

There are, besides, other circumstances which retard the progress of a man of genius, when he enters on a new pursuit, and which sometimes render him apparently inferiour to those who are possessed of ordinary capacity. A want of curiosity,[*] and of invention, facilitates greatly the acquisition of knowledge. It renders the mind passive, in receiving the ideas of others, and saves all the time which might be employed in examining their foundation, or in tracing their consequences. They who are possessed of much acuteness and originality, enter with difficulty into the views of others; not from any defect in their power of apprehension, but because they cannot adopt opinions which they have not examined; and because their attention is often seduced by their own speculations.

It is not merely in the acquisition of knowledge that a man of genius is likely to find himself surpassed by others: he has commonly his information much less at command, than those who are possessed of an inferiour degree of originality; and, what is somewhat remarkable, he has it least of all at command on those subjects on which he has found his invention most fertile. Sir Isaac Newton, as we are told by Dr. Pemberton, was often at a loss, when the conversation turned on his own discoveries.[†] It is probable that they made but a slight impression on his mind, and that a consciousness of his inventive powers prevented him from taking much pains to treasure them up in his memory. Men of little ingenuity seldom forget the ideas they acquire; because they know that when an occasion occurs for applying their knowledge to use, they must trust to memory and not to invention. Explain an arithmetical rule to a person of common understanding, who is unacquainted with the principles of the science; he will soon get the rule by heart, and become dexterous in the application of it. Another, of more ingenuity, will examine the principle of the rule before he applies it to use, and will scarcely take the trouble to commit to memory a process, which he knows he can, at any time, with a little reflection, recover. The consequence will be, that, in the practice of calculation, he will appear more slow and hesitating, than if he followed the received rules of arithmetic without reflection or reasoning.

Something of the same kind happens every day in conversation. By far the greater part of the opinions we announce in it, are not the immediate result of reasoning on the spot, but have been previously formed in the closet, or perhaps have been adopted implicitly on the authority of others. The promptitude, therefore, with which a man decides in ordinary discourse, is not a certain test of the quickness of his apprehension;[‡] as it may perhaps arise from those uncommon efforts to furnish the memory with acquired knowledge, by which men of slow parts endeavour to compensate for their want of invention; while, on the other hand, it is possible that a consciousness of originality may give rise to a manner apparently embarrassed, by leading the person who feels it, to trust too much to extempore exertions.*

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[*] I mean a want of curiosity about truth. "There are many men," says Dr. Butler, "who have a strong curiosity to know what is said, who have little or no curiosity to know "what is true."

[†] See Note (T.)

[‡] Memoria facit prompti ingenii famam, ut illa quae dicimus, non domo attulisse, sed ibi protinus sumpsisse videamur. QUINCTIL. *Inst. Orat.* lib. xi. cap. 2.

In general, I believe it may be laid down as a rule, that those who carry about with them a great degree of acquired information, which they have always at command, or who have rendered their own discoveries so familiar to them, as always to be in a condition to explain them, without recollection, are very seldom possessed of much invention, or even of much quickness of apprehension. A man of original genius, who is fond of exercising his reasoning powers anew on every point as its occurs to him, and who cannot submit to rehearse the ideas of others, or to repeat by rote the conclusions which he has deduced from previous reflection, often appears, to superficial observers, to fall below the level of ordinary understandings; while another, destitute both of quickness and invention, is admired for that promptitude in his decisions, which arises from the inferiority of his intellectual abilities.

It must indeed be acknowledged in favour of the last description of men, that in ordinary conversation they form the most agreable, and perhaps the most instructive companions. How inexhaustible soever the invention of an individual may be, the variety of his own peculiar ideas can bear no proportion to the whole mass of useful and curious information of which the world is already possessed. The conversation, accordingly, of men of genius, is sometimes extremely limited; and is interesting to the few alone, who know the value, and who can distinguish the marks of originality. In consequence too of that partiality which every man feels for his own speculations, they are more in danger of being dogmatical and disputatious, than those who have no system which they are interested to defend.

The same observations may be applied to authors. A book which contains the discoveries of one individual only, may be admired by a few, who are intimately acquainted with the history of the science to which it relates, but it has little chance for popularity with the multitude. An author who possesses industry sufficient to collect the ideas of others, and judgment sufficient to arrange them skilfully, is the most likely person to acquire a high degree of literary fame: and although, in the opinion of enlightened judges, invention forms the chief characteristic of genius, yet it commonly happens that the objects of public admiration are men who are much less distinguished by this quality, than by extensive learning and cultivated taste. Perhaps too, for the multitude, the latter class of authors is the most useful; as their writings contain the more solid discoveries which others have brought to light, separated from those errors, with which truth is often blended in the first formation of a system.

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* In the foregoing observations it is not meant to be implied, that originality of genius is incompatible with a ready recollection of acquired knowledge; but only that it has a tendency unfavourable to it, and that more time and practice will commonly be necessary to familiarize the mind of a man of invention to the ideas of others, or even to the conclusions of his own understanding, than are requisite in ordinary cases. Habits of literary conversation, and, still more, habits of extempore discussion in a popular assembly, are peculiarly useful in giving us a ready and practical command of our knowledge. There is much good sense in the following aphorism of Bacon: "Reading makes a full man, "writing a correct man, and speaking a ready man." See a commentary on this aphorism in one of the Numbers of the Adventurer.

CHAPTER SEVENTH.

OF IMAGINATION.

SECTION I.

Analysis of Imagination.

In attempting to draw the line between Conception and Imagination, I have already observed, that the province of the former is to present us with an exact transcript of what we have formerly felt and perceived; that of the latter, to make a selection of qualities and of circumstances from a variety of different objects, and by combining and disposing these, to form a new creation of its own.

According to the definitions adopted, in general, by modern philosophers, the province of imagination would appear to be limited to objects of sight. "It is the sense of sight," (says Mr. Addison,) "which furnishes the Imagination with its ideas; so that by the "pleasures of Imagination, I here mean such as arise from visible "objects, either when we have them actually in view, or when we "call up their ideas into our minds, by paintings, statues, descrip-"tions, or any the like occasions. We cannot, indeed, have a sin-"gle image in the fancy, that did not make its first entrance through "the sight." Agreeably to the same view of the subject, Dr. Reid observes, that "Imagination properly signifies a lively conception "of objects of sight; the former power being distinguished from "the latter, as a part from the whole."

That this limitation of the province of imagination to one particular class of our perceptions is altogether arbitrary, seems to me to be evident; for, although the greater part of the materials which imagination combines be supplied by this sense, it is nevertheless indisputable, that our other perceptive faculties also contribute occasionally their share. How many pleasing images have been borrowed from the fragrance of the fields and the melody of the groves; not to mention that sister art, whose magical influence over the human frame, it has been, in all ages, the highest boast of poetry to celebrate ! In the following passage, even the more gross sensations of Taste form the subject of an ideal repast, on which it is impossible not to dwell with some complacency; particularly after a perusal of the preceding lines, in which the Poet describes "the wonders of the Torrid Zone."

> Bear me, Pomona ! to thy citron groves;
> To where the lemon and the piercing lime,
> With the deep orange, glowing through the green,
> Their lighter glories blend. Lay me reclin'd
> Beneath the spreading tamarind that shakes,
> Fann'd by the breeze, its fever-cooling fruit:
> Or, stretch'd amid these orchards of the sun,
> O let me drain the cocoa's milky bowl,
> More bounteous far than all the frantic juice
> Which Bacchus pours! Nor, on its slender twigs
> Low bending, be the full pomegranate scorn'd;
> Nor, creeping through the woods, the gelid race
> Of berries. Oft in humble station dwells
> Unboastful worth, above fastidious pomp.
> Witness, thou best Anana, thou the pride
> Of vegetable life, beyond whate'er
> The Poets imag'd in the golden age:
> Quick let me strip thee of thy spiny coat,
> Spread thy ambrosial stores, and feast with Jove !*

What an assemblage of other conceptions, different from all those hitherto mentioned, has the genius of Virgil combined in one distich !

> Hic gelidi fontes, hic mollia prata, Lycori,
> Hic nemus: hic ipso tecum consumerer aevo.

These observations are sufficient to show, how inadequate a notion of the province of Imagination (considered even in its reference to the sensible world) is conveyed by the definitions of Mr. Addison and of Dr. Reid.—But the sensible world, it must be remembered, is not the only field where Imagination exerts her powers. All the objects of human knowledge supply materials to her forming hand ; diversifying infinitely the works she produces, while the mode of her operation remains essentially uniform. As it is the same power of Reasoning which enables us to carry on our investigations with respect to individual objects, and with respect to classes or genera ; so it was by the same processes of Analysis and Combination, that the genius of Milton produced the Garden of Eden ; that of Harrington, the Commonwealth of Oceana ; and that of Shakspeare, the characters of Hamlet and Falstaff. The difference between these several efforts of invention, consists only in the manner in which the original materials were acquired ; as far as the power of Imagination is concerned, the processes are perfectly analogous.

The attempts of Mr. Addison and of Dr. Reid to limit the province of imagination to objects of sight, have plainly proceeded from a very important fact, which it may be worth while to illustrate more particularly;—That the mind has a greater facility, and, of consequence, a greater delight in recalling the perceptions of this sense than those of any of the others; while, at the same time, the variety of qualities perceived by it is incomparably greater. It is this sense, accordingly, which supplies the painter and the statuary with *all* the subjects on which their genius is exercised; and which furnishes to the descriptive poet the largest and the most valuable portion of the materials which he combines. In that absurd species of prose composition, too, which borders on poetry, nothing is more remarkable than the predominance of phrases that recall to the memory glaring colours, and those splendid appearances of nature, which make a strong impression on the eye. It has been mentioned by different writers, as a characteristical circumstance in the Oriental or Asiatic style, that the greater part of the metaphors are taken from the celestial luminaries. "The Works of the "Persians," (says M. de Voltaire,) "are like the titles of their "kings, in which we are perpetually dazzled with the sun and the "moon." Sir William Jones, in a short Essay on the Poetry of Eastern Nations, has endeavoured to shew, that this is not owing to the bad taste of the Asiatics, but to the old language and popular religion of their country. But the truth is, that the very same criticism will be found to apply to the juvenile productions of every author possessed of a warm imagination; and to the compositions of every people, among whom a cultivated and philosophical taste has not established a sufficiently marked distinction between the appropriate styles of poetry and of prose. The account given by the Abbé Girard of the meaning of the word *Phébus*, as employed by the French critics, confirms strongly this observation. "Le Phébus "a un brillant qui signifie, ou semble signifier quelque chose: le "soleil y entre d'ordinaire; & c'est peut-être ce qui, en notre langue, "a donné lieu au nom de *Phébus*."*

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* Thomson's Summer.

Agreeably to these principles, Gray, in describing the infantine reveries of poetical genius, has fixed, with exquisite judgment, on this class of our conceptions:

> Yet oft before his infant eye would run
> Such Forms as glitter in the Muse's ray
> With Orient hues ————

From these remarks it may be easily understood, why the word *Imagination*, in its most ordinary acceptation, should be applied to cases where our conceptions are derived from the sense of sight; although the province of this power be, in fact, as unlimited as the sphere of human enjoyment and of human thought. Hence, the origin of those partial definitions which I have been attempting to correct; and hence too, the origin of the word *Imagination*; the etymology of which implies manifestly a reference to visible objects.

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* Synonymes François.

To all the various modes in which imagination may display itself, the greater part of the remarks contained in this chapter will be found to apply, under proper limitations; but, in order to render the subject more obvious to the reader's examination, I shall, in the farther prosecution of it, endeavour to convey my ideas, rather by means of particular examples, than in the form of general principles; leaving it to his own judgment to determine, with what modifications the conclusions to which we are led, may be extended to other combinations of circumstances.

Among the innumerable phenomena which this part of our constitution presents to our examination, the combinations which the mind forms out of materials supplied by the power of conception recommend themselves strongly, both by their simplicity, and by the interesting nature of the discussions to which they lead. I shall avail myself, therefore, as much as possible, in the following inquiries, of whatever illustrations I am able to borrow from the arts of Poetry and of Painting; the operations of imagination in these arts furnishing the most intelligible and pleasing exemplifications of the intellectual processes, by which, in those analogous but less palpable instances that fall under the consideration of the Moralist, the mind deviates from the models presented to it by experience, and forms to itself new and untried objects of pursuit. It is in consequence of such processes, (which, how little soever they may be attended to, are habitually passing in the thoughts of all men,) that human affairs exhibit so busy and so various a scene; tending, in one case, to improvement, and, in another, to decline; according as our notions of excellence and of happiness are just or erroneous.

It was observed in a former part of this work, that imagination is a complex power.* It includes Conception or simple Apprehension, which enables us to form a notion of those former objects of perception or of knowledge, out of which we are to make a selection; Abstraction, which separates the selected materials from the qualities and circumstances which are connected with them in nature; and Judgment or Taste, which selects the materials, and directs their combination. To these powers, we may add that particular habit of association to which I formerly gave the name of fancy; as it is this which presents to our choice, all the different materials which are subservient to the efforts of imagination, and which may therefore be considered as forming the ground-work of poetical genius.

To illustrate these observations, let us consider the steps by which Milton must have proceeded in creating his imaginary garden of Eden. When he first proposed to himself that subject of description, it is reasonable to suppose that a variety of the most striking scenes which he had seen crowded into his mind. The association of ideas suggested them, and the power of conception placed each of them before him with all its beauties and imperfections. In every natural scene, if we destine it for any particular purpose, there are defects and redundancies, which art may sometimes, but cannot always, correct. But the power of imagination is unlimited. She can create and annihilate; and dispose, at pleasure, her woods, her rocks, and her rivers. Milton, accordingly, would not copy his Eden from any one scene, but would select from each the features which were most eminently beautiful. The power of abstraction enabled him to make the separation, and taste directed him in the selection. Thus he was furnished with his materials; by a skilful combination of which, he has created a landscape, more perfect probably in all its parts, than was ever realized in nature; and certainly very different from any thing which this country exhibited, at the period when he wrote. It is a curious remark of Mr. Walpole, that Milton's Eden is free from the defects of the old English garden, and is imagined on the same principles which it was reserved for the present age to carry into execution.

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* See page 77.

From what has been said, it is sufficiently evident, that Imagination is not a simple power of the mind, like Attention, Conception, or Abstraction; but that it is formed by a combination of various faculties. It is farther evident, that it must appear under very different forms, in the case of different individuals; as some of its component parts are liable to be greatly influenced by habit and other accidental circumstances. The variety, for example, of the materials out of which the combinations of the Poet or the Painter are formed, will depend much on the tendency of external situation to store the mind with a multiplicity of Conceptions; and the beauty of these combinations will depend entirely on the success with which the power of Taste has been cultivated. What we call, therefore, the power of Imagination, is not the gift of nature, but the result of acquired habits, aided by favourable circumstances. It is not an original endowment of the mind, but an accomplishment formed by experience and situation; and which, in its different gradations, fills up all the interval between the first efforts of untutored genius, and the sublime creations of Raphael or of Milton.

An uncommon degree of Imagination constitutes *poetical genius;* a talent which, although chiefly displayed in poetical composition, is also the foundation (though not precisely in the same manner) of various other Arts. A few remarks on the relation which Imagination bears to some of the most interesting of these, will throw additional light on its nature and office.

SECTION II.

Of Imagination considered in its Relation to some of the Fine Arts.

AMONG the Arts connected with Imagination, some not only take their rise from this power, but produce objects which are addressed to it. Others take their rise from Imagination, but produce objects which are addressed to the power of Perception.

To the latter of these two classes of Arts, belongs that of Gardening; or, as it has been lately called, the art of creating Landscape. In this Art, the designer is limited in his creation by nature; and his only province is to correct, to improve, and to adorn. As he cannot repeat his experiments, in order to observe the effect, he must call up, in his imagination, the scene which he means to produce; and apply to this imaginary scene his taste and his judgment; or, in other words, to a lively conception of visible objects, he must add a power (which long experience and attentive observation alone can give him) of judging beforehand, of the effect which they would produce if they were actually exhibited to his senses. This power forms what Lord Chatham beautifully and expressively called, *the Prophetic Eye of Taste;* that eye which (if I may borrow the language of Mr. Gray) "sees all the beauties that a place is susceptible "of, long before they are born; and when it plants a seedling, al-"ready sits under the shade of it, and enjoys the effect it will have, "from every point of view that lies in the prospect."* But although the artist who creates a landscape, copies it from his imagination, the scene which he exhibits is addressed to the senses, and may produce its full effect on the minds of others, without any effort on their part, either of imagination or of conception.

To prevent being misunderstood, it is necessary for me to remark, that, in the last observation, I speak merely of the natural effects produced by a landscape, and abstracted entirely from the pleasure which may result from an accidental association of ideas with a particular scene. The effect resulting from such associations will depend, in a great measure, on the liveliness with which the associated objects are conceived, and on the affecting nature of the pictures which a creative imagination, when once roused, will present to the mind; but the pleasures thus arising from the accidental exercise that a landscape may give to the imagination, must not be confounded with those which it is naturally fitted to produce.

In Painting, (excepting in those instances in which it exhibits a faithful copy of a particular object,) the original idea must be formed in the imagination, and, in most cases, the exercise of imagination must concur with perception, before the picture can produce that effect on the mind of the spectator which the artist has in view. Painting, therefore, does not belong entirely to either of the two classes of Arts formerly mentioned, but has something in common with them both.

As far as the Painter aims at copying exactly what he sees, he may be guided mechanically by general rules; and he requires no aid from that creative genius which is characteristical of the Poet. The pleasure, however, which results from painting, considered merely as an imitative art, is extremely trifling; and is specifically different from that which it aims to produce, by awakening the imagination. Even in portrait-painting, the servile copyist of nature is regarded in no higher light than in that of a tradesman. "Deception," (as Reynolds has excellently observed,) "instead of advancing the art, is, in reality, carrying it back to its infant state. The first essays of painting were certainly nothing but mere imitations of individual objects; and when this amounted to a deception, the artist had accomplished his purpose."*

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* Gray's works, by Mason, p. 277.

When the history or the landscape Painter indulges his genius, in forming new combinations of his own, he vies with the Poet in the noblest exertion of the poetical art: and he avails himself of his professional skill, as the Poet avails himself of language, only to convey the ideas in his mind. To deceive the eye by accurate representations of particular forms, is no longer his aim; but, by the touches of an expressive pencil, to speak to the imaginations of others. Imitation, therefore, is not the end which he proposes to himself, but the means which he employs in order to accomplish it: nay, if the imitation be carried so far as to preclude all exercise of the spectator's imagination, it will disappoint, in a great measure, the purpose of the artist.

In Poetry, and in every other species of composition, in which one person attempts, by means of language, to present to the mind of another, the objects of his own imagination, this power is necessary, though not in the same degree, to the author and to the reader. When we peruse a description, we naturally feel a disposition to form, in our own minds, a distinct picture of what is described; and in proportion to the attention and interest which the subject excites, the picture becomes steady and determinate. It is scarcely possible for us to hear much of a particular town, without forming some notion of its figure and size and situation; and in reading history and poetry, I believe it seldom happens, that we do not annex imaginary appearances to the names of our favourite characters. It is, at the same time, almost certain, that the imaginations of no two men coincide upon such occasions; and, therefore, though both may be pleased, the agreeable impressions which they feel, may be widely different from each other, according as the pictures by which they are produced are more or less happily imagined. Hence it is, that when a person accustomed to dramatic reading sees, for the first time, one of his favourite characters represented on the stage, he is generally dissatisfied with the exhibition, however eminent the actor may be; and if he should happen, before this representation, to have been very familiarly acquainted with the character, the case may continue to be the same through life. For my own part, I have never received from any Falstaff on the stage, half the pleasure which Shakspeare gives me in the closet; and I am persuaded, that I should feel some degree of uneasiness, if I were present at any attempt to personate the figure or the voice of Don Quixote or Sancho Panca. It is not always that the actor, on such occasions, falls short of our expectation. He disappoints us, by exhibiting something different from what our imagination had anticipated, and which consequently appears to us, at the moment, to be an unfaithful representation of the Poet's idea: and until a frequent repetition of the performance has completely obliterated our former impressions, it is impossible for us to form an adequate estimate of its merit.

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* Notes on Mason's Translation of Fresnoy's Poem on the Art of Painting, p. 114.

Similar observations may be applied to other subjects. The sight of any natural scene, or of any work of art, provided we have not previously heard of it, commonly produces a greater effect, at first, than ever afterwards: but if, in consequence of a description, we have been led to form a previous notion of it, I apprehend, the effect will be found less pleasing, the first time it is seen than the second. Although the description should fall short greatly of the reality, yet the disappointment which we feel, on meeting with something different from what we expected, diminishes our satisfaction. The second time we see the scene, the effect of novelty is indeed less than before; but it is still considerable, and the imagination now anticipates nothing which is not realized in the perception.

The remarks which have been made, afford a satisfactory reason why so few are to be found who have a genuine relish for the beauties of poetry. The designs of Kent and of Brown evince in their authors a degree of imagination entirely analogous to that of the descriptive Poet; but when they are once executed, their beauties (excepting those which result from association) meet the eye of every spectator. In poetry the effect is inconsiderable, unless upon a mind which possesses some degree of the author's genius; a mind amply furnished, by its previous habits, with the means of interpreting the language which he employs; and able, by its own imagination, to co-operate with the efforts of his art.

It has been often remarked, that the general words which express complex ideas, seldom convey precisely the same meaning to different individuals, and that hence arises much of the ambiguity of language. The same observation holds, in no inconsiderable degree, with respect to the names of sensible objects. When the words River, Mountain, Grove, occur in a description, a person of lively conceptions naturally thinks of some particular river, mountain, and grove, that have made an impression on his mind; and whatever the notions are, which he is led by his imagination to form of these objects, they must necessarily approach to the standard of what he has seen. Hence it is evident that, according to the different habits and education of individuals, according to the liveliness of their conceptions, and according to the creative power of their imaginations, the same words will produce very different effects on different minds. When a person who has received his education in the country, reads a description of a rural retirement; the house, the river, the woods, to which he was first accustomed, present themselves spontaneously to his conception, accompanied, perhaps, with the recollection of his early friendships, and all those pleasing ideas which are commonly associated with the scenes of childhood and of youth. How different is the effect of the description upon his mind, from what it would produce on one who has passed his tender years at a distance from the beauties of nature, and whose infant sports are connected in his memory with the gloomy alleys of a commercial city!

But it is not only in interpreting the particular words of a description, that the powers of Imagination and Conception are employed. They are farther necessary for filling up the different parts of that picture, of which the most minute describer can only trace the outline. In the best description, there is much left to the reader to supply; and the effect which it produces on his mind will depend, in a considerable degree, on the invention and taste with which the picture is finished. It is therefore possible, on the one hand, that the happiest efforts of poetical genius may be perused with perfect indifference by a man of sound judgment, and not destitute of natural sensibility; and on the other hand, that a cold and common-place description may be the means of awakening, in a rich and glowing imagination, a degree of enthusiasm unknown to the author.

All the different arts which I have hitherto mentioned as taking their rise from the imagination, have this in common, that their primary object is to please. This observation applies to the art of Poetry no less than to the others; nay, it is this circumstance which characterizes Poetry, and distinguishes it from all the other classes of literary composition. The object of the Philosopher is to inform and enlighten mankind; that of the Orator, to acquire an ascendant over the will of others, by bending to his own purposes their judgments, their imaginations, and their passions: but the primary and the distinguishing aim of the Poet is, *to please;* and the principal resource which he possesses for this purpose, is by addressing the imagination. Sometimes, indeed, he may seem to encroach on the province of the Philosopher or of the Orator; but, in these instances, he only borrows from them the means by which he accomplishes his end. If he attempts to enlighten and to inform, he addresses the understanding only as a vehicle of pleasure: if he makes an appeal to the passions, it is only to passions which it is pleasing to indulge. The Philosopher, in like manner, in order to accomplish his end of instruction, may find it expedient, occasionally, to amuse the imagination, or to make an appeal to the passions: the Orator may, at one time, state to his hearers a process of reasoning; at another, a calm narrative of facts; and, at a third, he may give the reins to poetical fancy. But still the ultimate end of the Philosopher is to instruct, and of the Orator to persuade; and whatever means they make use of, which are not subservient to this purpose, are out of place, and obstruct the effect of their labours.

The measured composition in which the Poet expresses himself, is only one of the means which he employs to please. As the delight which he conveys to the imagination, is heightened by the other agreeable impressions which he can unite in the mind at the same time; he studies to bestow, upon the medium of communication which he employs, all the various beauties of which it is susceptible. Among these beauties, the harmony of numbers is not the least powerful; for its effect is constant, and does not interfere with any of the other pleasures which language produces. A succession of agreeable perceptions is kept up by the organical effect of words upon the ear; while they inform the understanding by their perspicuity and precision, or please the imagination by the pictures they suggest, or touch the heart by the associations they awaken. Of all these charms of language the Poet may avail himself; and they are all so many instruments of his art. To the Philosopher and the Orator they may *occasionally* be of use; and to both they must be *constantly* so far an object of attention, that nothing may occur in their compositions, which may distract the thoughts, by offending either the ear or the taste; but the Poet must not rest satisfied with this negative praise. Pleasure is the end of his art; and the more numerous the sources of it which he can open, the greater will be the effect produced by the efforts of his genius.

The province of the poet is limited only by the variety of human enjoyments. Whatever is in reality subservient to our happiness, is a source of pleasure, when presented to our conceptions, and may sometimes derive from the heightenings of imagination a momentary charm, which we exchange with reluctance for the substantial gratifications of the senses. The province of the painter, and of the statuary, is confined to the imitation of visible objects, and to the exhibition of such intellectual and moral qualities, as the human body is fitted to express. In ornamental architecture, and in ornamental gardening, the sole aim of the artist is to give pleasure to the eye, by the beauty or sublimity of material forms. But to the poet all the glories of external nature; all that is amiable or interesting, or respectable in human character; all that excites and engages our benevolent affections; all those truths which make the heart feel itself better and more happy; all these supply materials, out of which he forms and peoples a world of his own, where no inconveniences damp our enjoyments, and where no clouds darken our prospects.

That the pleasures of poetry arise chiefly from the agreeable feelings which it conveys to the mind, by awakening the imagination, is a proposition which may seem too obvious to stand in need of proof. As the ingenious Inquirer, however, into "The Origin "of our Ideas of the Sublime and Beautiful," has disputed the common notions upon this subject, I shall consider some of the principal arguments by which he has supported his opinion.

The leading principle of the theory which I am now to examine is, "That the common effect of poetry is not to raise ideas of things;" or, as I would rather choose to express it, its common effect is not to give exercise to the powers of conception and imagination. That I may not be accused of misrepresentation, I shall state the doctrine at length in the words of the author. "If words have all their pos-

"sible extent of power, three effects arise in the mind of the hear-"er. The first is the *sound;* the second, the *picture*, or represen-"tation of the thing signified by the sound; the third is, the *affection* "of the soul, produced by one or by both of the foregoing. Com-"pounded abstract words, (honour, justice, liberty, and the like,) "produce the first and the last of these effects, but not the second. "Simple abstracts are used to signify some one simple idea, without "much adverting to others which may chance to attend it; as blue, "green, hot, cold, and the like: these are capable of effecting all "three of the purposes of words; as the aggregate words, man, "castle, horse, &c. are in a yet higher degree. But I am of opi-"nion, that the most general effect even of these words, does not "arise from their forming pictures of the several things they would "represent in the imagination; because, on a very diligent exami-"nation of my own mind, and getting others to consider theirs, I do "not find that once in twenty times any such picture is formed; and "when it is, there is most commonly a particular effort of the imagi-"nation for that purpose. But the aggregate words operate, as I "said of the compound abstracts, not by presenting any image to "the mind, but by having from use the same effect on being men-"tioned, that their original has when it is seen. Suppose we were "to read a passage to this effect: 'The river Danube rises in a "moist and mountainous soil in the heart of Germany, where, wind-"ing to and fro, it waters several principalities, until turning into "Austria, and leaving the walls of Vienna, it passes into Hungary; "there with a vast flood, augmented by the Saave and the Drave, it "quits Christendom, and rolling through the barbarous countries "which border on Tartary, it enters by many mouths into the "Black Sea.' In this description many things are mentioned; as "mountains, rivers, cities, the sea, &c. But let any body examine "himself, and see whether he has had impressed on his imagination "any pictures of a river, mountain, watery soil, Germany, &c. In-"deed, it is impossible in the rapidity and quick succession of words "in conversation, to have ideas both of the sound of the word, and "of the thing represented; besides, some words expressing real es-"sences, are so mixed with others of a general and nominal import, "that it is impracticable to jump from sense to thought, from parti-"culars to generals, from things to words, in such a manner as to an-"swer the purposes of life; nor is it necessary that we should."

In farther confirmation of this doctrine, Mr. Burke refers to the poetical works of the late amiable and ingenious Dr. Blacklock. "*Here*," says he, "*is a poet, doubtless as much affected by his own* "*descriptions, as any that reads them can be;* and yet he is affected "with this strong enthusiasm, by things of which he neither has, nor "can possibly have, any idea, farther than that of a bare sound; "and why may not those who read his works be affected in the "same manner that he was, with as little of any real ideas of the "things described?"

Before I proceed to make any remarks on these passages, I must observe in general, that I perfectly agree with Mr. Burke, in thinking that a very great proportion of the words which we habitually employ, have no effect to "raise ideas in the mind;" or to exercise the powers of conception and imagination. My notions on this subject I have already sufficiently explained in treating of abstraction.

I agree with him farther, that a great proportion of the words which are used in poetry and eloquence, produce very powerful effects on the mind, by exciting emotions which we have been accustomed to associate with particular sounds; without leading the imagination to form to itself any pictures or representations; and his account of the manner in which such words operate, appears to me satisfactory. "Such words are in reality but mere sounds; but they "are sounds, which, being used on particular occasions, wherein "we receive some good, or suffer some evil; or see others affected with good or evil; or which we hear applied to other "interesting things or events; and being applied in such a variety "of cases, that we know readily by habit to what things they belong, they produce in the mind, whenever they are afterwards "mentioned, effects similar to those of their occasions. The sounds "being often used without reference to any particular occasion, and "carrying still their first impressions, they at last utterly lose their "connexion with the particular occasions that gave rise to them; "yet the sound, without any annexed notion, continues to operate as "before."

Notwithstanding, however, these concessions, I cannot admit that it is in this way poetry produces its principal effect. Whence is it that general and abstract expressions are so tame and lifeless, in comparison of those which are particular and figurative? Is it not because the former do not give any exercise to the imagination, like the latter? Whence the distinction, acknowledged by all critics, ancient and modern, between that charm of words which evaporates in the process of translation, and those permanent beauties, which presenting to the mind the distinctness of a picture, may impart Pleasure to the most remote regions and ages? Is it not, that in the one case, the Poet addresses himself to associations which are local and temporary; in the other, to those essential principles of human nature, from which Poetry and Painting derive their common attractions? Hence, among the various sources of the sublime, the peculiar stress laid by Longinus on what he calls *Visions*, (*Φαντασιαι*)—*ὁταν ἁ λεγῃς, ὑπ' ενθουσιασμου και παθους βλεπειν δοκῃς, και ὑπ' οψιν τιθῃς τοις ακουουσιν.**

In treating of abstraction I formerly remarked, that the perfection of the philosophical style is to approach as nearly as possible to that species of language we employ in algebra, and to exclude every expression which has a tendency to divert the attention by ng the imagination, or to bias the judgment by casual associa-

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* De Sublim § xv.—Quas *φαντασιας* Graeci vocant, nos sanè *Visiones* appellamus; per quas imagines rerum absentium ita repraesentantur animo, ut eas cernere oculis, ac praesentes habere, videamur. QUINCT. *Inst. Orat.* vi. 2.

For this purpose the Philosopher ought to be sparing in the yment of figurative words, and to convey his notions by gene- which have been accurately defined. To the Orator, on hand, when he wishes to prevent the cool exercise of the un- ing, it may, on the same account, be frequently useful to de- r to agitate his hearers, by blending with his reasonings the s of poetry, or the magical influence of sounds consecrated feelings. A regard to the different ends thus aimed at phical and in Rhetorical composition, renders the orna- are so becoming in the one, inconsistent with good good sense, when adopted in the other.

y, as truths and facts are introduced, not for the purpose of in- but to convey pleasure to the mind, nothing offends more, general expressions which form the great instrument of reasoning. The original pleasures, which it is the poetry to recall to the mind, are all derived from individual and, of consequence, (with a very few exceptions, which belong to my present subject to enumerate,) the more , and the more appropriated its language is, the greater the charm it possesses.

respect to the description of the course of the Danube already I shall not dispute the result of the experiment to be as represents it. That words may often be applied to their purposes, without our annexing any particular notions to have formerly shewn at great length; and I admit that the of this description may be so understood. But to be un- is not the sole object of the poet: his primary object is to and the pleasure which he conveys will, in general, be to be proportioned to the beauty and liveliness of the images he suggests. In the case of a poet born blind, the effect of must depend on other causes; but whatever opinion we may this point, it appears to me impossible, that such a poet receive, even from his own descriptions, the same degree sure, which they may convey to a reader, who is capable of ing the scenes which are described. Indeed this instance Mr. Burke produces in support of his theory, is sufficient of shew, that the theory cannot be true in the extent in which ted.

way of contrast to the description of the Danube, I shall stanza from Gray, which affords a very beautiful example two different effects of poetical expression. The pleasure by the two last lines resolves almost entirely into Mr. principles; but, great as this pleasure is, how inconsidera- in comparison of that arising from the continued and varied which the preceding lines give to the imagination?

"In climes beyond the solar road,
"Where shaggy forms o'er ice-built mountains roam,

"The muse has broke the twilight gloom,
"To cheer the shivering natives' dull abode.
"And oft, beneath the odorous shade,
"Of Chili's boundless forests laid,
"She deigns to hear the savage youth repeat,
"In loose numbers wildly sweet,
"Their feather cinctur'd chiefs, and dusky loves.
"Her track where'er the goddess roves,
"Glory pursue, and generous shame,
"Th' unconquerable mind, and freedom's holy flame."

I cannot help remarking further, the effect of the solemn and uniform flow of the verse in this exquisite stanza, in retarding the pronunciation of the reader; so as to arrest his attention to every successive picture, till it has time to produce its proper impression. More of the charm of poetical rhythm arises from this circumstance, than is commonly imagined.

To those who wish to study the theory of poetical expression, no author in our language affords a richer variety of illustrations than the poet last quoted. His merits, in many other respects, are great; but his skill in this particular is more peculiarly conspicuous. How much he had made the principles of this branch of his art an object of study, appears from his letters published by Mr. Mason.

I have sometimes thought, that, in the last line of the following passage, he had in view the two different effects of words already described; the effect of some, in awakening the powers of Conception and Imagination; and that of others, in exciting associated emotions:

"Hark, his hands the lyre explore!
"Bright-ey'd Fancy hovering o'er,
"Scatters from her pictur'd urn,
"Thoughts, that breathe, and words, that burn."——

SECTION III.

Continuation of the same Subject.—Relation of Imagination and of Taste to Genius.

From the remarks made in the foregoing Sections, it is obvious, in what manner a person accustomed to analyze and combine his conceptions, may acquire an idea of beauties superiour to any which he has seen realized. It may also be easily inferred, that a habit of forming such intellectual combinations, and of remarking their effects on our own minds, must contribute to refine and to exalt the Taste, to a degree which it never can attain in those men, who study to improve it by the observation and comparison of external objects only.

A cultivated Taste, combined with a creative Imagination, constitutes Genius in the Fine Arts. Without taste, imagination could produce only a random analysis and combination of our conceptions;

and without imagination, taste would be destitute of the faculty of invention. These two ingredients of genius may be mixed together in all possible proportions; and where either is possessed in a degree remarkably exceeding what falls to the ordinary share of mankind, it may compensate in some measure for a deficiency in the other. An uncommonly correct taste, with little imagination, if it does not produce works which excite admiration, produces at least nothing which can offend. An uncommon fertility of imagination even when it offends, excites our wonder by its creative powers; and shews what it could have performed, had its exertions been guided by a more perfect model.

In the infancy of the Arts, a union of these two powers in the same mind is necessary for the production of every work of genius. Taste, without imagination, is, in such a situation, impossible; for, as there are no monuments of ancient genius on which it can be formed, it must be the result of experiments, which nothing but the imagination of every individual can enable him to make. Such a taste must necessarily be imperfect, in consequence of the limited experience of which it is the result; but, without imagination, it could not have been acquired even in this imperfect degree.

In the progress of the Arts the case comes to be altered. The productions of genius accumulate to such an extent, that taste may be formed by a careful study of the works of others; and, as formerly imagination had served as a necessary foundation for taste, so taste begins now to invade the province of imagination. The combinations which the latter faculty has been employed in making, during a long succession of ages, approach to infinity; and present such ample materials to a judicious selection, that with a high standard of excellence, continually present to the thoughts, industry, assisted by the most moderate degree of imagination, will, in time, produce performances, not only more free from faults, but incomparably more powerful in their effects, than the most original efforts of untutored genius, which, guided by an uncultivated taste, copies after an inferiour model of perfection. What Reynolds observes of Painting, may be applied to all the other Fine arts; that, "as the "Painter, by bringing together in one piece, those beauties, which "are dispersed amongst a great variety of individuals, produces a "figure more beautiful that can be found in nature; so that artist "who can unite in himself the excellencies of the various painters, "will approach nearer to perfection than any of his masters."*

SECTION IV.

Of the Influence of Imagination on Human Character and Happiness.

HITHERTO we have considered the power of Imagination chiefly as it is connected with the Fine Arts. But it deserves our attention still more, on account of its extensive influence on human character and happiness.

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* Page 152.

The lower animals, as far as we are able to judge, are entirely occupied with the objects of their present perceptions: and the case is nearly the same with the inferiour orders of our own species. One of the principal effects which a liberal education produces on the mind, is to accustom us to withdraw our attention from the objects of sense, and to direct it, at pleasure, to those intellectual combinations which delight the imagination. Even, however, among men of cultivated understandings, this faculty is possessed in very unequal degrees by different individuals; and these differences (whether resulting from original constitution or from early education) lay the foundation of some striking varieties in human character.

What we commonly call sensibility, depends, in a great measure, on the power of imagination. Point out to two men, any object of compassion;—a man, for example, reduced by misfortune from easy circumstances to indigence. The one feels merely in proportion to what he perceives by his senses. The other follows, in imagination, the unfortunate man to his dwelling, and partakes with him and his family in their domestic distresses. He listens to their conversation, while they recall to remembrance the flattering prospects they once indulged; the circle of friends they had been forced to leave; the liberal plans of education which were begun and interrupted; and pictures out to himself all the various resources which delicacy and pride suggest, to conceal poverty from the world. As he proceeds in the painting, his sensibility increases, and he weeps, not for what he sees, but for what he imagines. It will be said, that it was his sensibility which originally roused his imagination; and the observation is undoubtedly true; but it is equally evident on the other hand, that the warmth of his imagination increases and prolongs his sensibility.

This is beautifully illustrated in the Sentimental Journey of Sterne. While engaged in a train of reflections on the State Prisons in France, the accidental sight of a starling in a cage suggests to him the idea of a captive in his dungeon. He indulges his imagination, "and looks through the twilight of the grated door to take the picture."

"I beheld," (says he,) "his body half-wasted away with long expectation and confinement, and felt what kind of sickness of the heart it is, which arises from hope deferred. Upon looking nearer, I saw him pale and feverish: in thirty years the western breeze had not once fanned his blood: he had seen no sun, no moon, in all that time, nor had the voice of friend or kinsman breathed through his lattice.——His children——But here my heart began to bleed, and I was forced to go on with another part of the portrait.

"He was sitting upon the ground, in the farthest corner of his dungeon, on a little straw, which was alternately his chair and bed:

“ a little calendar of small sticks was laid at the head, notched all
“ over with the dismal days and nights he had passed there;—he
“ had one of these little sticks in his hand, and with a rusty nail he
“ was etching another day of misery to add to the heap. As I dark-
“ ened the little light he had, he lifted up a hopeless eye towards
“ the door, then cast it down—shook his head, and went on with his
“ work of affliction.”

The foregoing observations may account, in part, for the effect which exhibitions of fictitious distress produce on some persons, who do not discover much sensibility to the distresses of real life. In a Novel, or a Tragedy, the picture is completely finished in all its parts; and we are made acquainted not only with every circumstance on which the distress turns, but with the sentiments and feelings of every character with respect to his situation. In real life we see, in general, only detached scenes of the Tragedy; and the impression is slight, unless imagination finishes the characters, and supplies the incidents that are wanting.

It is not only to scenes of distress that imagination increases our sensibility. It gives us a double share in the prosperity of others, and enables us to partake, with a more lively interest, in every fortunate incident that occurs either to individuals or to communities. Even from the productions of the earth, and the vicissitudes of the year, it carries forward our thoughts to the enjoyments they bring to the sensitive creation, and by interesting our benevolent affections in the scenes we behold, lends a new charm to the beauties of nature.

I have often been inclined to think, that the apparent coldness and selfishness of mankind may be traced, in a great measure, to a want of attention and a want of imagination. In the case of misfortunes which happen to ourselves, or to our near connexions, neither of these powers is necessary to make us acquainted with our situation; so that we feel, of necessity, the correspondent emotions. But without an uncommon degree of both, it is impossible for any man to comprehend completely the situation of his neighbour, or to have an idea of a great part of the distress which exists in the world. If we feel therefore more for ourselves than for others, the difference is to be ascribed, at least partly, to this; that, in the former case, the facts which are the foundation of our feelings, are more fully before us than they possibly can be in the latter.

In order to prevent misapprehensions of my meaning, it is necessary for me to add, that I do not mean to deny that it is a law of our nature, in cases in which there is an interference between our own interest and that of other men, to give a certain degree of preference to ourselves; even supposing our neighbour's situation to be as completely known to us as our own. I only affirm, that, where this preference becomes blamable and unjust, the effect is to be accounted for partly in the way I mentioned.* One striking proof of this is, the powerful emotions which may be occasionally excited in the minds of the most callous, when the attention has been once fixed, and the imagination awakened, by eloquent and circumstantial and pathetic description.

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* I say partly; for habits of inattention to the situation of other men undoubtedly presuppose some defect in the social affections.

A very amiable and profound moralist, in the account which he has given of the origin of our sense of justice, has, I think, drawn a less pleasing picture of the natural constitution of the human mind, than is agreeable to truth. "To disturb," (say she,) "the happiness "of our neighbour, merely because it stands in the way of our own; "to take from him what is of real use to him, merely because it "may be of equal or of more use to us; or, to indulge, in this manner, at the expense of other people, the natural preference which "every man has for his own happiness above that of other people, "is what no impartial spectator can go along with. Every man is, "no doubt, first and principally recommended to his own care; and "as he is fitter to take care of himself than of any other person, it "is fit and right that it should be so. Every man, therefore, is much "more deeply interested in whatever immediately concerns himself, "than in what concerns any other man: and to hear, perhaps, of the "death of another person with whom we have no particular connexion, will give us less concern, will spoil our stomach, or break "our rest, much less than a very insignificant disaster which has befallen ourselves. But though the ruin of our neighbour may affect "us much less than a very small misfortune of our own, we must "not ruin him to prevent that small misfortune, nor even to prevent "our own ruin. We must here, as in all other cases, view ourselves "not so much according to that light in which we may naturally appear to ourselves, as according to that in which we naturally appear to others.—Though every man may, according to the proverb, be the whole world to himself, to the rest of mankind he is a "most insignificant part of it. Though his own happiness may be of "more importance to him than that of all the world besides, to every "other person it is of no more consequence than that of any other "man. Though it may be true, therefore, that every individual, in "his own breast, naturally prefers himself to all mankind, yet he "dares not look mankind in the face, and avow that he acts according to this principle. He feels that in this preference they can "never go along with him, and that how natural soever it may be "to him, it must always appear excessive and extravagant to them. "When he views himself in the light in which he is conscious that "others will view him, he sees that to them he is but one of the "multitude, in no respect better than any other in it. If he would "act so as that the impartial spectator may enter into the principles "of his conduct, which is what of all things he has the greatest desire to do, he must, upon this, as upon all other occasions, humble "the arrogance of his self-love, and bring it down to something "which other men can go along with."

I am ready to acknowledge, that there is much truth in this passage; and that a prudential regard to the opinion of others, might teach a man of good sense, without the aid of more amiable motives, to conceal his unreasonable partialities in favour of himself, and to act agreeably to what he conceives to be the sentiments of impartial spectators. But I cannot help thinking, that the fact is much too strongly stated with respect to the natural partiality of self-love, supposing the situation of our neighbours to be as completely presented to our view, as our own must of necessity be. When the Orator wishes to combat the selfish passions of his audience, and to rouse them to a sense of what they owe to mankind; what mode of persuasion does nature dictate to him? Is it to remind them of the importance of the good opinion of the world, and of the necessity, in order to obtain it, of accommodating their conduct to the sentiments of others, rather than to their own feelings? Such considerations undoubtedly might, with some men, produce a certain effect, and might lead them to assume the appearance of virtue; but they would never excite a sentiment of indignation at the thought of injustice, or a sudden and involuntary burst of disinterested affection. If the Orator can only succeed in fixing their attention to facts, and in bringing these facts home to their imagination by the power of his eloquence, he has completely attained his object. No sooner are the facts apprehended, than the benevolent principles of our nature display themselves in all their beauty. The most cautious and timid lose, for a moment, all thought of themselves, and despising every consideration of prudence or of safety, become wholly engrossed with the fortunes of others.

Many other facts, which are commonly alleged as proofs of the original selfishness of mankind, may be explained, in part, in a similar way; and may be traced to habits of inattention, or to a want of imagination, arising, probably from some fault in early education.

What has now been remarked with respect to the social principles, may be applied to all our other passions, excepting those which take their rise from the body. They are commonly strong in proportion to the warmth and vigour of the imagination.

It is, however, extremely curious, that when an imagination, which is naturally phlegmatic, or which, like those of the vulgar, has little activity from a want of culture, is fairly roused by the descriptions of the Orator or of the Poet, it is more apt to produce the violence of enthusiasm, than in minds of a superiour order. By giving this faculty occasional exercise we acquire a great degree of command over it. As we can withdraw the attention at pleasure from objects of sense, and transport ourselves into a world of our own, so when we wish to moderate our enthusiasm, we can dismiss the objects of imagination, and return to our ordinary perceptions and occupations. But in a mind to which these intellectual visions are not familiar, and which borrows them completely from the genius of another, imagination, when once excited, becomes perfectly ungovernable, and produces something like a temporary insanity. Hence the wonderful effects of popular eloquence on the lower orders; effects which are much more remarkable than what it ever produces on men of education.

SECTION V.

Continuation of the same subject.—Inconveniences resulting from an ill-regulated imagination.

It was undoubtedly the intention of Nature, that the objects of perception should produce much stronger impressions on the mind than its own operations. And, accordingly, they always do so, when proper care has been taken in early life, to exercise the different principles of our constitution. But it is possible, by long habits of solitary reflection, to reverse this order of things, and to weaken the attention to sensible objects to so great a degree, as to leave the conduct almost wholly under the influence of imagination. Removed to a distance from society, and from the pursuits of life, when we have been long accustomed to converse with our own thoughts, and have found our activity gratified by intellectual exertions, which afford scope to all our powers and affections, without exposing us to the inconveniences resulting from the bustle of the world, we are apt to contract an unnatural predilection for meditation, and to lose all interest in external occurrences. In such a situation too, the mind gradually loses that command, which education, when properly conducted, gives it over the train of its ideas; till at length the most extravagant dreams of imagination acquire as powerful an influence in exciting all its passions, as if they were realities. A wild and mountainous country, which presents but a limited variety of objects, and these only of such a sort as "awake to solemn "thought," has a remarkable effect in cherishing this enthusiasm.

When such disorders of the imagination have been long confirmed by habit, the evil may perhaps be beyond a remedy; but in their inferior degrees, much may be expected from our own efforts; in particular, from mingling gradually in the business and amusements of the world; or, if we have sufficient force of mind for the exertion, from resolutely plunging into those active and interesting and hazardous scenes, which, by compelling us to attend to external circumstances, may weaken the impressions of imagination, and strengthen those produced by realities. The advice of the poet, in these cases, is equally beautiful and just:

> "Go, soft enthusiast! quit the cypress groves,
> "Nor to the rivulet's lonely moanings tune
> "Your sad complaint. Go, seek the cheerful haunts
> "Of men, and mingle with the bustling crowd;
> "Lay schemes for wealth, or power, or fame, the wish
> "Of nobler minds, and push them night and day.
> "Or join the caravan in quest of scenes
> "New to your eyes, and shifting every hour,
> "Beyond the Alps, beyond the Apennines.
> "Or, more adventurous, rush into the field
> "Where war grows hot; and raging through the sky,
> "The lofty trumpet swells the madd'ning soul;

" And in the hardy camp and toilsome march,
" Forget all softer and less manly cares."*

The disordered state of mind to which these observations refer is the more interesting, that it is chiefly incident to men of uncommon sensibility and genius. It has been often remarked, that there is a connexion between genius and melancholy; and there is one sense of the word *melancholy*, in which the remark is undoubtedly true; a sense which it may be difficult to define, but in which it implies nothing either gloomy or malevolent.† This, I think, is not only confirmed by facts, but may be inferred from some principles which were formerly stated on the subject of invention; for as the disposition now alluded to has a tendency to retard the current of thought, and to collect the attention of the mind, it is peculiarly favourable to the discovery of those profound conclusions which result from an accurate examination of the less obvious relations among our ideas. From the same principles too may be traced some of the effects which situation and early education produce on the intellectual character. Among the natives of wild and solitary countries we may expect to meet with sublime exertions of poetical imagination and of philosophical research; while those men whose attention has been dissipated from infancy amidst the bustle of the world, and whose current of thought has been trained to yield and accommodate itself, every moment, to the rapid succession of trifles which diversify fashionable life, acquire, without any effort on their part, the intellectual habits which are favourable to gayety, vivacity, and wit.

When a man, under the habitual influence of a warm imagination, is obliged to mingle occasionally in the scenes of real business, he is perpetually in danger of being misled by his own enthusiasm. What we call good sense in the conduct of life, consists chiefly in that temper of mind which enables its possessor to view, at all times, with perfect coolness and accuracy, all the various circumstances of his situation; so that each of them may produce its due impression on him, without any exaggeration arising from his own peculiar habits. But to a man of an ill-regulated imagination, external circumstances only serve as hints to excite his own thoughts, and the conduct he pursues has, in general, far less reference to his real situation, than to some imaginary one, in which he conceives himself to be placed: in consequence of which, while he appears to himself to be acting with the most perfect wisdom and consistency, he may frequently exhibit to others all the appearances of folly. Such, pretty nearly, seems to be the idea which the Author‡ of the " Reflections on the Character and Writings of Rousseau," has formed of that extraordinary man. " His faculties," we are told, " were

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* Armstrong.

† Δια τι παντες ὅσοι περιττοι γεγονασιν ανδρες, η κατα φιλοσοφιαν, η πολιτικην, η ποιησιν, η τεχνας, φαινονται μελαγχολικοι οντες.

ARISTOT. Problem. sect. xxx.

‡ Madame de STAEL HOLSTEIN.

"slow in their operation, but his heart was ardent: it was in consequence of his own meditations, that he became impassioned: he discovered no sudden emotions, but all his feelings grew upon reflection. It has, perhaps, happened to him to fall in love gradually with a woman, by dwelling on the idea of her during her absence. Sometimes he would part with you with all his former affection; but if an expression had escaped you, which might bear an unfavourable construction, he would recollect it, examine it, exaggerate it, perhaps dwell upon it for a month, and conclude by a total breach with you. Hence it was, that there was scarce a possibility of undeceiving him; for the light which broke in upon him at once was not sufficient to efface the wrong impressions which had taken place so gradually in his mind. It was extremely difficult, too, to continue long on an intimate footing with him. A word, a gesture, furnished him with matter of profound meditation: he connected the most trifling circumstances like so many mathematical propositions, and conceived his conclusions to be supported by the evidence of demonstration. I believe," continues this ingenious writer, "that imagination was the strongest of his faculties, and that it had almost absorbed all the rest. He dreamed rather than existed, and the events of his life might be said, more properly, to have passed in his mind, than without him: a mode of being, one should have thought, that ought to have secured him from distrust, as it prevented him from observation; but the truth was, it did not hinder him from attempting to observe; it only rendered his observations erroneous. That his soul was tender, no one can doubt, after having read his works; but his imagination sometimes interposed between his reason and his affections, and destroyed their influence: he appeared sometimes void of sensibility; but it was because he did not perceive objects such as they were. Had he seen them with our eyes, his heart would have been more affected than ours."

In this very striking description we see the melancholy picture of sensibility and genius approaching to insanity. It is a case, probably, that but rarely occurs in the extent here described: but I believe, there is no man who has lived much in the world, who will not trace many resembling features to it, in the circle of his own acquaintances: perhaps there are few, who have not been occasionally conscious of some resemblance to it in themselves.

To these observations we may add, that by an excessive indulgence in the pleasures of imagination, the taste may acquire a fastidious refinement unsuitable to the present situation of human nature; and those intellectual and moral habits, which ought to be formed by actual experience of the world, may be gradually so accommodated to the dreams of poetry and romance, as to disqualify us for the scene in which we are destined to act. Such a distempered state of the mind is an endless source of errour; more particularly when we are placed in those critical situations, in which our conduct determines our future happiness or misery; and which, on account of this extensive influence on human life, form the principal ground-work of fictitious composition. The effect of novels, in misleading the passions of youth, with respect to the most interesting and important of all relations, is one of the many instances of the inconveniences resulting from an ill regulated imagination.

The passion of love has been, in every age, the favourite subject of the poets, and has given birth to the finest productions of human genius. These are the natural delight of the young and susceptible, long before the influence of the passions is felt; and from these a romantic mind forms to itself an ideal model of beauty and perfection, and becomes enamoured with its own creation. On a heart which has been long accustomed to be thus warmed by the imagination, the excellencies of real characters make but a slight impression: and, accordingly, it will be found that men of a romantic turn, unless when under the influence of violent passions, are seldom attached to a particular object. Where, indeed, such a turn is united with a warmth of temperament, the effects are different; but they are equally fatal to happiness. As the distinctions which exist among real characters are confounded by false and exaggerated conceptions of ideal perfection, the choice is directed to some object by caprice and accident; a slight resemblance is mistaken for an exact coincidence; and the descriptions of the poet and novelist are applied literally to an individual, who perhaps falls short of the common standard of excellence. "I am certain," says the Author last quoted, in her account of the character of Rousseau, "that he never formed an attachment which was not founded "on caprice. It was illusions alone that could captivate his passions; "and it was necessary for him always to accomplish his mistress "from his own fancy. I am certain also," she adds, "that the woman whom he loved the most, and perhaps the only woman whom "he loved constantly, was his own *Julie*."

In the case of this particular passion, the effects of a romantic imagination are obvious to the most careless observer; and they have often led moralists to regret, that a temper of mind so dangerous to happiness should have received so much encouragement from some writers of our own age, who might have employed their genius to better purposes. These, however, are not the only effects which such habits of study have on the character. Some others, which are not so apparent at first view, have a tendency, not only to mislead us where our own happiness is at stake, but to defeat the operation of those active principles, which were intended to unite us to society. The manner in which imagination influences the mind, in the instances which I allude to at present, is curious, and deserves a more particular explanation.

I shall have occasion afterwards to shew,* in treating of our moral powers, that experience diminishes the influence of passive impressions on the mind, but strengthens our active principles. A course of debauchery deadens the sense of pleasure, but increases the desire of gratification. An immoderate use of strong liquors destroys the sensibility of the palate, but strengthens the habit of intemperance. The enjoyments we derive from any favourite pursuit gradually decay as we advance in years: and yet we continue to prosecute our favourite pursuits with increasing steadiness and vigour.

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* The following reasoning was suggested to me by a passage in Butler's Analogy, which the reader will find in Note (U) at the end of the volume.

On these two laws of our nature is founded our capacity of moral improvement. In proportion as we are accustomed to obey our sense of duty, the influence of the temptations to vice is diminished; while, at the same time, our habit of virtuous conduct is confirmed. How many passive impressions, for instance, must be overcome, before the virtue of beneficence can exert itself uniformly and habitually! How many circumstances are there in the distresses of others, which have a tendency to alienate our hearts from them, and which prompt us to withdraw from the sight of the miserable! The impressions we receive from these are unfavourable to virtue: their force, however, every day diminishes, and it may perhaps, by perseverance, be wholly destroyed. It is thus that the character of the beneficent man is formed. The passive impressions which he felt originally, and which counteracted his sense of duty, have lost their influence, and a habit of beneficence is become part of his nature.

It must be owned, that this reasoning may, in part, be retorted; for among those passive impressions, which are weakened by repetition, there are some which have a beneficial tendency. The uneasiness, in particular, which the sight of distress occasions, is a strong incentive to acts of humanity; and it cannot be denied that it is lessened by experience. This might naturally lead us to expect, that the young and unpractised would be more disposed to perform beneficent actions, than those who are advanced in life, and who have been familiar with scenes of misery. And, in truth, the fact would be so, were it not that the effect of custom on this passive impression is counteracted by its effects on others; and, above all, by its influence in strengthening the active habit of beneficence. An old and experienced physician is less affected by the sight of bodily pain, than a younger practitioner; but he has acquired a more confirmed habit of assisting the sick and helpless, and would offer greater violence to his nature, if he should withhold from them any relief that he has in his power to bestow. In this case, we see a beautiful provision made for our moral improvement, as the effects of experience on one part of our constitution are made to counteract its effects on another.

If the foregoing observations be well founded, it will follow, that habits of virtue are not to be formed in retirement, but by mingling in the scenes of active life, and that an habitual attention to exhibitions of fictitious distress, is not merely useless to the character, but positively hurtful.

It will not, I think, be disputed, that the frequent perusal of pathetic compositions diminishes the uneasiness which they are naturally fitted to excite. A person who indulges habitually in such studies, may feel a growing desire of his usual gratification, but he is every day less and less affected by the scenes which are presented to him. I believe it would be difficult to find an actor long hackneyed on the stage, who is capable of being completely interested by the distresses of a tragedy. The effect of such compositions and representations, in rendering the mind callous to actual distress, is still greater; for as the imagination of the Poet almost always carries him beyond truth and nature, a familiarity with the tragic scenes which he exhibits, can hardly fail to deaden the impression produced by the comparatively trifling sufferings which the ordinary course of human affairs presents to us. In real life, a provision is made for this gradual decay of sensibility, by the proportional decay of other passive impressions, which have an opposite tendency, and by the additional force which our active habits are daily acquiring. Exhibitions of fictitious distress, while they produce the former change on the character, have no influence in producing the latter: on the contrary, they tend to strengthen those passive impressions which counteract beneficence. The scenes into which the Novelist introduces us are, in general, perfectly unlike those which occur in the world. As his object is to please, he removes from his descriptions every circumstance which is disgusting, and presents us with histories of elegant and dignified distress. It is not such scenes that human life exhibits. We have to act, not with refined and elevated characters, but with the mean, the illiterate, the vulgar, and the profligate. The perusal of fictitious history has a tendency to increase that disgust which we naturally feel at the concomitants of distress, and to cultivate a false refinement of taste, inconsistent with our condition as members of society. Nay, it is possible for this refinement to be carried so far, as to withdraw a man from the duties of life, and even from the sight of those distresses which he might alleviate. And, accordingly, many are to be found, who, if the situations of romance were realized, would not fail to display the virtues of their favourite characters, whose sense of duty is not sufficiently strong to engage them in the humble and private scenes of human misery.

To these effects of fictitious history we may add, that it gives no exercise to our active habits. In real life, we proceed from the passive impression to those exertions which it was intended to produce. In the contemplation of imaginary sufferings, we stop short at the impression, and whatever benevolent dispositions we may feel, we have no opportunity of carrying them into action.

From these reasonings it appears, that an habitual attention to exhibitions of fictitious distress, is in every view calculated to check our moral improvement. It diminishes that uneasiness which we feel at the sight of distress, and which prompts us to relieve it.

It strengthens that disgust which the loathsome concomitants of distress excite in the mind, and which prompts us to avoid the sight of misery; while, at the same time, it has no tendency to confirm those habits of active beneficence, without which, the best dispositions are useless. I would not, however, be understood to disapprove entirely of fictitious narratives, or of pathetic compositions. On the contrary, I think that the perusal of them may be attended with advantage, when the effects which I have mentioned are corrected by habits of real business. They soothe the mind when ruffled by the rude intercourse of society, and stealing the attention insensibly from our own cares, substitute, instead of discontent and distress, a tender and pleasing melancholy. By exhibitions of characters a little elevated above the common standard, they have a tendency to cultivate the taste in life; to quicken our disgust at what is mean or offensive, and to form the mind insensibly to elegance and dignity. Their tendency to cultivate the powers of moral perception has never been disputed; and when the influence of such perceptions is powerfully felt, and is united with an active and manly temper, they render the character not only more amiable, but more happy in itself, and more useful to others; for although a rectitude of judgment with respect to conduct, and strong moral feelings, do, by no means, alone constitute virtue; yet they are frequently necessary to direct our behaviour in the more critical situations of life; and they increase the interest we take in the general prosperity of virtue in the world. I believe, likewise, that, by means of fictitious history, displays of character may be most successfully given, and the various weaknesses of the heart exposed. I only mean to insinuate, that a taste for them may be carried too far; that the sensibility which terminates in imagination, is but a refined and selfish luxury; and that nothing can effectually advance our moral improvement, but an attention to the active duties which belong to our stations.

SECTION VI.

Continuation of the same Subject.—Important Uses to which the power of Imagination is subservient.

The faculty of Imagination is the great spring of human activity, and the principal source of human improvement. As it delights in presenting to the mind scenes and characters more perfect than those which we are acquainted with, it prevents us from ever being completely satisfied with our present condition, or with our past attainments, and engages us continually in the pursuit of some untried enjoyment, or of some ideal excellence. Hence the ardour of the selfish to better their fortunes, and to add to their personal accomplishments; and hence the zeal of the Patriot and the Philosopher to advance the virtue and the happiness of the human race. Destroy this faculty, and the condition of man will become as stationary as that of the brutes.

When the notions of enjoyment or of excellence which imagination has formed, are greatly raised above the ordinary standard, they interest the passions too deeply to leave us at all times the cool exercise of reason, and produce that state of the mind which is commonly known by the name of Enthusiasm; a temper which is one of the most fruitful sources of error and disappointment; but which is a source, at the same time, of heroic actions and of exalted characters. To the exaggerated conceptions of eloquence which perpetually revolved in the mind of Cicero; to that idea which haunted his thoughts of *aliquid immensum infinitumque;* we are indebted for some of the most splendid displays of human genius: and it is probable that something of the same kind has been felt by every man who has risen much above the level of humanity, either in speculation or in action. It is happy for the individual, when these enthusiastic desires are directed to events which do not depend on the caprice of fortune.

The pleasure we receive from the higher kinds of poetry takes rise, in part, from that dissatisfaction which the objects of imagination inspire us with, for the scenes, the events, and the characters, with which our senses are conversant. Tired and disgusted with this world of imperfection, we delight to escape to another of the poet's creation, where the charms of nature wear an eternal bloom, and where sources of enjoyment are opened to us, suited to the vast capacities of the human mind. On this natural love of poetical fiction, Lord Bacon has founded a very ingenious argument for the soul's immortality; and, indeed, one of the most important purposes to which it is subservient, is to elevate the mind above the pursuits of our present condition, and to direct the views to higher objects. In the mean time, it is rendered subservient also, in an eminent degree, to the improvement and happiness of mankind, by the tendency which it has to accelerate the progress of society.

As the pictures which the Poet presents to us are never (even in works of pure description) faithful copies from nature, but are always meant to be improvements on the originals she affords, it cannot be doubted that they must have some effect in refining and exalting our taste, both with respect to material beauty, and to the objects of our pursuit in life. It has been alleged, that the works of our descriptive poets have contributed to diffuse that taste for picturesque beauty, which is so prevalent in England, and to recall the public admiration from the fantastic decorations of art, to the more powerful and permanent charms of cultivated nature; and it is certain, that the first ardours of many an illustrious character have been kindled by the compositions of Homer and Virgil. It is difficult to say, to what a degree, in the earlier periods of society, the rude compositions of the bard and the minstrel may have been instrumental in humanizing the minds of savage warriors, and in accelerating the growth of cultivated manners. Among the Scandinavians and the Celtæ we know that this order of men was held in very peculiar veneration; and, accordingly, it would appear, from the monuments which remain of these nations, that they were distinguished by a delicacy in the passion of love, and by a humanity and generosity to the vanquished in war, which seldom appear among barbarous tribes; and with which it is hardly possible to conceive how men in such a state of society could have been inspired, but by a separate class of individuals in the community, who devoted themselves to the pacific profession of poetry, and to the cultivation of that creative power of the mind, which anticipates the course of human affairs; and presents, in prophetic vision, to the poet and the philosopher, the blessings which accompany the progress of reason and refinement.

Nor must we omit to mention the important effects of Imagination in multiplying the sources of innocent enjoyment, beyond what this limited scene affords. Not to insist on the nobler efforts of genius, which have rendered this part of our constitution subservient to moral improvement; how much has the sphere of our happiness been extended by those agreeable fictions which introduce us to new worlds, and make us acquainted with new orders of being! What a fund of amusement, through life, is prepared for one who reads, in his childhood, the fables of ancient Greece! They dwell habitually on the memory, and are ready, at all times, to fill up the intervals of business, or of serious reflection; and in his hours of rural retirement and leisure, they warm his mind with the fire of ancient genius, and animate every scene he enters, with the offspring of classical fancy.

It is, however, chiefly in painting future scenes, that Imagination loves to indulge herself, and her prophetic dreams are almost always favourble to happiness. By an erroneous education, indeed, it is possible to render this faculty an instrument of constant and of exquisite distress; but in such cases (abstracting from the influence of a constitutional melancholy) the distresses of a gloomy imagination are to be ascribed not to nature, but to the force of early impressions.

The common bias of the mind undoubtedly is, (such is the benevolent appointment of Providence,) to think favourably of the future; to overvalue the chances of possible good, and to underrate the risks of possible evil; and in the case of some fortunate individuals, this disposition remains after a thousand disappointments. To what this bias of our nature is owing, it is not material for us to inquire: the fact is certain, and it is an important one to our happiness. It supports us under the real distresses of life, and cheers and animates all our labours: and although it is sometimes apt to produce, in a weak and indolent mind, those deceitful suggestions of ambition and vanity, which lead us to sacrifice the duties and the comforts of the present moment, to romantic hopes and expectations; yet it must be acknowledged, when connected with habits of activity, and regulated by a solid judgment, to have a favourable effect on the character, by inspiring that ardour and enthusiasm which both prompt to great enterprises, and are necessary to ensure their success. When such a temper is united (as it commonly is) with pleasing notions, concerning the order of the universe, and in particular concerning the condition and the prospects of man, it places our happiness in a great measure beyond the power of fortune. While it adds a double relish to every enjoyment, it blunts the edge of all our sufferings; and even when human life presents to us no object on which our hopes can rest, it invites the imagination beyond the dark and troubled horizon which terminates all our earthly prospects, to wander unconfined in the regions of futurity. A man of benevolence, whose mind is enlarged by Philosophy, will indulge the same agreeable anticipations with respect to society; will view all the different improvements in arts, in commerce, and in the sciences, as co-operating to promote the union, the happiness, and the virtue of mankind; and, amidst the political disorders resulting from the prejudices and follies of his own times, will look forward with transport, to the blessings which are reserved for posterity in a more enlightened age.

NOTES AND ILLUSTRATIONS.

Note (A.) page 11.

I am happy in being able to quote the following passage, in illustration of a doctrine, against which I do not conceive it possible to urge any thing, but the authority of some illustrious names.

" Puisque l'existence des corps n'est pour nous que la permanence d'etres dont " les propriétés répondent à un certain ordre de nos sensations, il en résulte, qu'elle " n'a rien de plus certain que celle d'autres etres qui se manifestent également par " leurs effets sur nous ; et puisque nos observations sur nos propres facultés, con- " firmées par celles que nous faisons sur les etres pensants qui animent aussi des " corps, ne nous montrent aucune analogie entre l'etre qui sent ou qui pense, et " l'etre qui nous offre le phénomene de l'étendue ou de l'impénétrabilité, il n'y a " aucune raison de croire ces etres de la même nature. Ainsi la spiritualité de " l'ame n'est pas une opinion qui ait besoin de preuves, mais le résultat simple et " naturel d'une analyse exacte de nos idées, et de nos facultés."*—*Vie de M. Tur-" got par M. Condorcet.*

Des Cartes was the first philosopher who stated, in a clear and satisfactory manner, the distinction between mind and matter, and who pointed out the proper plan for studying the intellectual phenomena. It is chiefly in consequence of his precise ideas with respect to this distinction, that we may remark, in all his metaphysical writings, a perspicuity which is not observable in those of any of his predecessors.

Dr. Reid has remarked, that although Des Cartes infers the existence of mind from the operations of which we are conscious, yet he could not reconcile himself to the notion of an unknown substance, or substratum, to which these operations belonged. And it was on this account, he conjectures, that he made the essence of the soul to consist in thought; as, for a similar reason, he had made the essence of matter to consist in extension. But I am afraid, that this supposition is not perfectly reconcileable with Des Cartes' writings; for he repeatedly speaks with the utmost confidence of the existence of substances of which we have only a relative idea; and, even in attempting to shew that thought is the essential attribute of mind, and extension of matter, he considers them as nothing more than attributes or qualities belonging to these substances.

" Per substantiam nihil aliud intelligere possumus, quam rem quæ ita existit, ut " nulla alia re indigeat ad existendum. Et quidem substantia quæ nulla plane re

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* [Since the existence of bodies is to us only the permanence of beings, the properties of which coincide with a certain order of our sensations, it follows, that it is not more certain than that of other beings which equally manifest themselves by their effects upon us; and since our observations upon our own faculties, confirmed by those which we make upon thinking beings which also animate bodies, show us no analogy between the being which feels and thinks, and the being which exhibits the appearance of extension or of impenetrability, there is no reason for believing these to be beings of the same nature. Thus the spirituality of the soul is not an opinion which has need of proof, but the simple and natural result of an exact analysis of our ideas and faculties.]

" indigeat, unica tantum potest intelligi, nempe Deus. Alias vero omnes, non nisi " ope concursus Dei, existere posse percipimus. Atque ideo nomen substantiæ non " convenit Deo et illis, *univoce*, ut dici solet in scholis; hoc est, nulla ejus nominis " significatio poteste distincte intelligi, quæ Deo, et creaturis sit communis.

" Possunt autem substantia corporea, et mens, sive substantia cogitans, creatæ, " sub hoc communi conceptu intelligi; quod sint res, quæ solo Dei concursu egent " ad existendum. Verumtamen non potest substantia primum animadverti ex hoc " solo, quod sit res existens, quia hoc solum per se nos non afficit: sed facile ipsam " agnoscimus ex quolibet ejus attributo, per communem illam notionem quod nihili " nulla sunt attributa, nullæve proprietates aut qualitates. Ex hoc enim, quod " aliquod attributum adesse percipiamus, concludimus aliquam rem existentem, " sive substantiam, cui illud tribui possit, necessario etiam adesse.

" Et quidem ex quolibet attributo substantia cognoscitur: sed una tamen est " cujusque substantiæ præcipua proprietas, quæ ipsius naturam essentiamque con- " stituit, et ad quam aliæ omnes referuntur. Nempe extensio in longum, latum et " profundum substantiæ corporeæ naturam constituit; et cogitatio constituit na- " turam substantiæ cogitantis."—*Princip. Philosoph.* pars. i. cap. 51, 52, 53.*

In stating the relative notions, which we have of mind and of body, I have avoided the use of the word *substance*, as I am unwilling to furnish the slightest occasion for controversy; and have contented myself with defining *mind* to be *that*, which feels, thinks, wills, hopes, fears, desires, &c. That my consciousness of these and other operations is necessarily accompanied with a conviction of my own existence, and with a conviction that all of them belong to one and the same being, is not an hypothesis, but a fact; of which it is no more possible for me to doubt, than of the reality of my own sensations or volitions.

Note (B.) p. 43.

Doctor Reid remarks, that Des Cartes rejected a part only of the ancient theory of perception, and adopted the other part. " That theory," says he, " may be " divided into two parts: the first, that images, species, or forms of external ob- " jects, come from the object, and enter by the avenues of the senses to the mind: " the second part is, that the external object itself is not perceived, but only the " species or image of it in the mind. The first part, Des Cartes and his followers " rejected and refuted by solid arguments; but the second part, neither he nor his " followers have thought of calling in question; being persuaded that it is only a " representative image in the mind, of the external object, that we perceive, and not " the object itself. And this image, which the Peripatetics called a *Species*, he " calls an idea, changing the name only, while he admits the thing."

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* [By *substance* we can understand nothing but that which so exists, as that no other thing is necessary to its existence. And that substance which clearly needs no other, can be understood as one only, namely, God. But we perceive that all other substances exist only by the support of the divinity. And therefore the term *substance* is not properly applied to them and to God, *univoce*, as we say in the schools; that is, no signification of that term can be distinctly understood as common to God and his creatures.

Nevertheless, corporeal substance, and mind, or thinking substance, being created, may be understood in this common notion, as things which begin to exist by the sole power of the Deity. But substance cannot first be perceived from this alone, that it is a thing existing, because this of itself cannot be perceived by us; but we easily perceive it by some attribute; according to the common maxim, that of nothing there can be no attributes, no qualities or properties. When we perceive, therefore, some attribute to exist, we easily conclude that some essence or substance necessarily exists, to which it may belong. And indeed a substance is discerned by any property, but there is one principal attribute of every substance, which constitutes its nature and essence, to which all the others are referred; so extension into length, breadth, and thickness constitutes the nature of corporeal substance, and thought constitutes the nature of thinking substance.]

The account which this passage contains of Des Cartes' doctrine concerning perception, is, I believe, agreeable to his prevailing opinion, as it may be collected from the general tenor of his writings; and the observation with which it concludes is undoubtedly true, that neither he, nor any of his followers ever called in question the existence of ideas, as the immediate objects of our perception. With respect, however, to the first part of the ancient theory, as here stated, it may be proper to remark, that Des Cartes, although evidently by no means satisfied with it, sometimes expresses himself as if he rather doubted of it, than expressly denied it; and at other times, when pressed with objections to his own particular system, he admits, at least in part, the truth of it. The following passage is one of the most explicit I recollect, in opposition to the ancient doctrine.

"Observandum præterea, animam, nullis imaginibus ab objectis ad cerebrum missis egere ut sentiat, (contra quam communiter philosophi nostri statuunt,) aut ad minimum longe aliter illarum imaginum naturam concipiendam esse quam vulgo fit. Quum enim circa eas nil considerent, praeter similitudinem earum cum objectis quæ repræsentant, non possunt explicare, qua ratione ab objectis formari queant, et recipi ab organis sensuum exteriorum, et demum nervis ad cerebrum transvehi. Nec alia causa imagines istas fingere eos impulit, nisi quod viderent mentem nostram efficaciter pictura excitari ad apprehendendum objectum illud, quod exhibet: ex hoc enim judicarunt, illam eodem modo excitandam, ad apprehendenda ea quæ sensus movent, per exiguas quasdam imagines, in capite nostro delineatas. Sed nobis contra est advertendum multa praeter imagines esse, quæ cogitationes excitant, ut exempli gratia, verba et signa, nullo modo similia iis quæ significant."*—*Dioptric.* cap. 4. § 6.

In his third meditation (which contains his celebrated argument for the existence of a Deity) the following passage occurs.

"Sed hic præcipue de iis est quærendum quas tanquam a rebus extra me existentibus desumptas considero, quænam me moveat ratio ut illas istis rebus similes esse existimem; nempe ita videor doctus a natura, et præterea experior illas non a mea voluntate nec proinde a me ipso pendere, sæpe enim vel invito obversantur, ut jam, sive velim sive nolim, sentio calorem, et ideo puto sensum illum, sive ideam coloris, a re a me diversa, nempe ab ignis, cui assideo, calore mihi advenire, nihilque magis obvium est, quam ut judicem istam rem suam similitudinem potius, quam aliud quid in me immittere; quæ rationes an satis firmæ sint, jam videbo. Cum hic dico me ita doctum esse a natura, intelligo tantum spontaneo quodam impetu me ferri ad hoc credendum, non lumine aliquo naturali mihi ostendi esse verum, quæ duo multum discrepant, nam quæcumque lumine naturali mihi ostenduntur, (ut quod ex eo quod dubitem sequatur me esse, et similia,) nullo modo dubia, esse possunt, quia nulla alia facultas esse potest, cui æque fidam ac lumini isti, quæque illa non vera possit docere; sed quantum ad impetus naturales, jam sæpe olim judicavi me ab illis in deteriorem partem fuisse impulsum cum de bono eligendo ageretur, nec video cur iisdem in ulla alia re magis fidam. Deinde quamvis ideæ illæ a volunate mea non pendeant, non ideo constat ipsas a rebus extra me positis necessario procedere; ut enim impetus illi, de quibus mox loquebar, quamvis in me sint, a voluntate tamen mea diversi esse videntur, ita forte etiam aliqua alia est in me facultas nondum mihi satis cognita istarum idearum effectrix, ut hactenus semper visum est illas, dum somnio, absque ulla rerum externarum ope in me formari; ac denique quamvis a rebus a me di-

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* [Besides, it is to be observed, that the soul (contrary to what is maintained by our philosophers) has need of no images transmitted from objects to the brain, to enable it to perceive; or at least, that the nature of these images is to be conceived as very different from the common notion of it. For these philosophers conceive of them only as resembling the objects which they represent, but cannot explain in what manner they are formed from the objects, and received by the organs of the external senses, and finally transmitted by the nerves to the brain. And they have been led to feign the existence of these images, only because they perceive that our mind is enabled by the picture, to apprehend the object which it exhibits. Hence they have concluded, that it is in like manner enabled to apprehend those things which affect the senses, by certain minute images, delineated in the brain. But we may remark, that there are many things besides these images, which excite the thoughts, for instance, words and signs, in no degree resembling those things which they signify.]

" versis procederent, non inde sequitur illas rebus istis similes esse debere; quinimo in multis sæpe magnum discrimen videor deprehendisse; sic, exempli causa, duas diversas solis ideas apud me invenio, unam tanquam a sensibus haustam, et quæ maxime inter illas quas adventitias existimo est recensenda, per quam mihi valde parvus apparet; aliam vero ex rationibus astronomiæ desumptam, hoc est ex notionibus quibusdam mihi innatis elicitam vel quocumque alio modo a me factam, per quam aliquoties major quam terra exhibetur; utraque profecto similis eidem soli extra me existenti esse non potest, et ratio persuadet illam ei maxime esse dissimilem, quae quam proxime ab ipso videtur emanâsse. Quae omnia satis demonstrant me non hactenus ex certo judicio, sed tantum ex cæco aliquo impulsu credidisse res quasdam a me diversas existere, quae ideas sive imagines suas per organa sensuum, vel quolibet alio pacto mihi immittant."*

Among other animadversions upon this meditation sent to Des Cartes by one of his correspondents, it is objected; "Videris vertere in dubium non tantum utrum ideæ aliquæ procedant ex rebus externis, sed etiam utrum omnino sint externae res aliquae."† To which Des Cartes answers: "Notandum est, me non affirmasse ideas rerum materialium ex mente deduci, ut non satis bona fide hic fingis; expresse enim postea ostendi ipsas a corporibus sæpe advenire, ac per hoc corporum existentiam probari."‡—*Vide Objectiones in Meditationes Renati Des Cartes, cum ejusdem ad illas Responsionibus.*

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* [And here it is especially necessary to inquire concerning those which I consider as taken from things existing without me, what argument induces me to believe that they have any likeness to those things; namely, that I seem to be so taught by nature, and find by experience, that they depend not upon my will, and therefore upon myself: for they often force themselves upon me, as at present, whether willing or not, I feel heat, and therefore suppose that this sense or idea of heat comes from something without myself, namely, from the heat of the fire by which I am writing. And nothing is more natural than that I should suppose this to transmit to me something resembling itself, rather than any thing different. How just this reasoning is, I shall shortly see. When I say, I am so taught by nature, I mean nothing more, than that I am led thus to believe, by a certain spontaneous impulse, not that this is shown to me as a truth by any light of nature: which two things are very different; for whatsoever is clearly shewn me by this natural light (as, because I doubt, therefore I exist, and the like) can by no means be doubtful, because there can be no faculty entitled to equal confidence with this light, which can prove this not to be true. On the contrary, with respect to these spontaneous impulses, I have often seen that they had deceived me in the choice of good, and I know not why I should more willingly trust them in other matters. Again that those ideas do not depend upon my will, by no means proves that they necessarily depend upon things without me; for as these impulses of which I have just spoken, although they are within me, yet appear very different from my will, so there is perhaps within me some other faculty, not yet sufficiently understood, which produces those ideas; in sleep, for instance, they seem to arise without any external aid. And finally, although they proceed from things without, it by no means follows that they resemble those things. Nay, in many, there seems to be the greatest dissimilarity. Thus, for example, I find I have two distinct notions of the sun, the one drawn from the senses, and which I consider as an idea entirely adventitious, according to which it appears to me very small; and another notion respecting the sun, drawn from the calculations of astronomy, elicited from certain innate ideas, or otherwise framed in my mind, by which it appears many times larger than the earth. Both of these notions cannot resemble that sun which exists without me, and reason assures me, that of the two, the one which seems to flow directly from the object, is the most unlike it. All this sufficiently demonstrates, that hitherto I believe from no certain evidence, but rather from a blind impulse, in the existence of certain things without, distinct from myself, which transmit their ideas or images by the organs of my senses, or in some other mode.]

† [" You seem to doubt, not only whether any ideas proceed from external things, but even, whether there be any things external."]

‡ [It must be remembered, I have not affirmed that ideas of material things arise from the mind, as you erroneously suppose; for I afterwards expressly prove, that they often arise from bodies, and that the existence of bodies is thus shewn.]

Note (C.) page 45.

In consequence of the inferences which Mr. Hume has deduced from this doctrine concerning cause and effect, some later authors have been led to dispute its truth; not perceiving that the fallacy of this part of Mr. Hume's system does not consist in his premises, but in the conclusion which he draws from them.

That the object of the physical inquirer is not to trace necessary connexions or to ascertain the efficient causes of phenomena, is a principle which has been frequently ascribed to Mr. Hume as its author, both by his followers and by his opponents; but it is, in fact, of a much earlier date, and has been maintained by many of the most enlightened, and the least sceptical of our modern philosophers; nor do I know that it was ever suspected to have a dangerous tendency, till the publication of Mr. Hume's writings. "If we except," (says Dr. Barrow,) "the mutual causality and dependence of the terms of a mathematical demonstration, I do not think that there is any other causality in the nature of things, wherein a necessary consequence can be founded. Logicians do indeed boast of I do not know what kind of demonstrations from external causes either efficient or final, but without being able to shew one genuine example of any such; nay, I imagine it is impossible for them so to do. For there can be no such connexion of an external efficient cause with its effect," (at least none such can be understood by us,) "through which, strictly speaking, the effect is necessarily supposed by the supposition of the efficient cause, or any determinate cause by the supposition of the effect." He adds afterwards, "Therefore there can be no argumentation from an efficient cause to the effect, or from an effect to the cause which is lawfully necessary."—*Mathematical Lectures read at Cambridge.*

Bp. Butler too, in his discourse on the ignorance of man, has remarked, that "it is in general no more than effects that the most knowing are acquainted with; for as to causes, they are as entirely in the dark as the most ignorant." "What are the laws," (he continues,) "by which matter acts on matter, but certain effects, which some, having observed to be frequently repeated, have reduced to general rules?"—BUTLER's *Sermons.*

"The laws of attraction and repulsion" (says Dr. Berkeley) "are to be regarded as laws of motion, and these only as rules or methods observed in the productions of natural effects, the efficient and final causes whereof are not of mechanical consideration. Certainly, if the explaining a phenomenon be to assign its proper efficient and final cause, it should seem the mechanical philosophers never explained any thing; their province being only to discover the laws of nature; that is, the general rules and methods of motion; and to account for particular phenomena, by reducing them under, or shewing their conformity to such general rules."—SIRIS: *or, Philosophical Inquiries concerning the Virtues of Tar Water*, p. 108.

"The words *attraction* and *repulsion* may, in compliance with custom, be used where, accurately speaking, motion alone is meant."—*Ibid.* p. 114.

"Attraction cannot produce, and in that sense account for, the phenomena; being itself one of the phenomena produced and to be accounted for."—*Ibid.* p. 115.

"There is a certain analogy, constancy, and uniformity in the phenomena or appearances of nature, which are a foundation for general rules; and these are a grammar for the understanding of nature, or that series of effects in the visible world, whereby we are enabled to foresee what will come to pass in the natural course of things. Plotinus observes, in his third Ennead, that the art of presaging, is in some sort the reading of natural letters denoting order, and that so far forth as analogy obtains in the universe, there may be vaticination. And in reality, he that foretells the motions of the planets, or the effects of medicines, or the result of chemical or mechanical experiments, may be said to do it by natural vaticination."—*Ibid.* p. 120, 121.

"Instruments, occasions, and signs, occur in, or rather make up, the whole visible course of nature."—*Ibid.* p. 123.

The following very remarkable passage from Mr. Locke shews clearly, that this eminent philosopher considered the connexion between impulse and motion, as a *conjunction* which we learn from experience only, and not as a consequence deducible from the consideration of impulse, by any reasoning *a priori*. The passage is the more curious, that it is this particular application of Mr. Hume's doctrine, that has been generally supposed to furnish the strongest objection against it.

"Another idea we have of body, is the power of communicating motion by impulse; and of our souls, the power of exciting motion by thought. These ideas, the one of body, the other of our minds, every day's experience clearly furnishes us with: but if here again we inquire how this is done, we are equally in the dark. For in the communication of motion by impulse, wherein as much motion is lost to one body, as is got to the other, which is the ordinariest case, we can have no other conception, but of the passing of motion out of the one into another; which I think is as obscure and inconceivable, as how our minds move or stop our bodies by thought, which we every moment find they do."

———"The communication of motion by thought, which we ascribe to spirit, is as evident as that of impulse which we ascribe to body. Constant experience makes us sensible of both of these, though our narrow understandings can comprehend neither."

———"To conclude, sensation convinces us, that there are solid extended substances; and reflection, that there are thinking ones: experience assures us of the existence of such beings; and that the one hath a power to move body by impulse, and the other by thought.—If we would inquire farther into their nature, causes, and manner, we perceive not the nature of extension clearer than we do of thinking. If we would explain them any farther, one is as easy as the other; and there is no more difficulty to conceive, how a substance we know not, should by thought set body into motion, than how a substance we know not, should by impulse set body into motion."—LOCKE, book ii. chap. 23. § 28, 29.

It is not indeed very easy to reconcile the foregoing observations, which are, in every respect, worthy of the sagacity of this excellent philosopher, with the passage quoted from him in page 50 of this work.

Some of Mr. Hume's reasonings concerning the nature of the connexions among physical events, coincide perfectly with those of Malebranche on the same subject; but they were employed by this last writer to support a very different conclusion.

At a still earlier period, Hobbes expressed himself with respect to physical connexions, in terms so nearly approaching to Mr. Hume's that it is difficult to suppose that they did not suggest to him the language which he has employed on that subject. "What we call experience," (he remarks) "is nothing else but remembrance of what antecedents have been followed by what consequents."—"No man," (he continues,) "can have in his mind a conception of the future; for the future is not yet; but of our conceptions of the past we make a future, or rather call past, future relatively. Thus after a man hath been accustomed to see like antecedents followed by like consequents, whensoever he seeth the like come to pass to any thing he had seen before, he looks there should follow it the same that followed then.—When a man hath so often observed like antecedents to be followed by like consequents, that whensoever he seeth the antecedent, he looketh again for the consequent, or when he seeth the consequent, maketh account there hath been the like antecedent, then he calleth both the antecedent and the consequent signs of one another."—HOBBES' *Tripos*.

I am doubtful whether I should not add to these authorities, that of Lord Bacon, who, although he has no where formally stated the doctrine now under consideration, has plainly taken it for granted in all his reasonings on the method of prosecuting philosophical inquiries; for if we could perceive in any instance the manner in which a cause produces its effect, we should be able to deduce effect from its cause by reasoning *a priori*; the impossibility of which he every where strongly inculcates. "Homo naturæ minister et interpres tantum facit et intelligit quantum de naturæ ordine re vel mente observaverit; nec amplius scit aut potest."[*] I acknowledge, at the same time, that, from the general scope of Lord Bacon's writings, as well as from some particular expressions in them with regard to causes, I am inclined to believe that his metaphysical notions on the subject were not very accurate, and that he was led to perceive the necessity of recurring to observation and experiment in natural philosophy, not from a speculative consideration of our ignorance concerning necessary connexions, but from a conviction, founded on a review of the history of science, of the insufficiency of those methods of inquiry which his predecessors had pursued. The notion which the ancients had formed of the object of philosophy, (which they conceived to be the investigation of efficient causes,) was the principal circumstance which misled them in their researches: and the erroneous opinion of Des Cartes on the same subject, frustrated all the efforts of his great and inventive genius, in the study of physics. "Perspicuum est," (says he, in one passage,) "optimam philosophandi viam nos sequuturos, si "ex ipsius Dei cognitione rerum ab eo creatarum cognitionem deducere conemur, "ut ita scientiam perfectissimam quæ est effectuum per causas acquiramus."[*] [†]

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[*] [Man, as the minister and interpreter of nature, performs and understands so much only, as according to his circumstances and intelligence he can comprehend of the order of nature; beyond this neither his knowledge nor ability extends.]

The strong prejudice which has been entertained of late against Mr. Hume's doctrine concerning the connexion among physical events, in consequence of the dangerous conclusions to which it has erroneously been supposed to lead, will, I hope, be a sufficient apology for multiplying so many authorities in support of it.

Note (D.) page 47.

This language has even been adopted by philosophers, and by atheists as well as theists. The latter have represented natural events as parts of a great chain, the highest link of which is supported by the Deity. The former have pretended, that there is no absurdity in supposing the number of links to be infinite. Mr. Hume had the merit of shewing clearly to philosophers, that our common language, with respect to cause and effect, is merely analogical; and that if there be any links among physical events, they must forever remain invisible to us. If this part of his system be admitted; and if, at the same time, we admit the authority of that principle of the mind, which leads us to refer every change to an efficient cause; Mr. Hume's doctrine seems to be more favourable to theism, than even the common notions upon this subject; as it keeps the Deity always in view, not only as the first, but as the constantly operating efficient cause in nature, and as the great connecting principle among all the various phenomena which we observe. This, accordingly, was the conclusion which Malebranche deduced from premises very nearly the same with Mr. Hume's.

Note (E.) page 70.

Mr. Locke, in his Essay on Human Understanding, has taken notice of the quickness with which the operations of the mind are carried on, and has referred to the acquired perceptions of sight, as a proof of it. The same Author has been struck with the connexion between this class of facts and our habitual actions: but he does not state the question, whether such actions are voluntary or not. I think it probable, from his mode of expression, that his opinion on the subject was the same with mine. The following quotation contains all the remarks I recollect in his writings, that have any connexion with the doctrines of the present chapter:

"We are farther to consider, concerning perception, that the ideas we receive "by sensation are often, in grown people, altered by the judgment, without our "taking notice of it. When we set before our eyes a round globe, of any uni"form colour, *e. g.* gold, alabaster, or jet, it is certain that the idea thereby im"printed on our mind is of a flat circle, variously shadowed, with several degrees "of light and brightness coming to our eyes. But we, having by use been accus"tomed to perceive what kind of appearance convex bodies are wont to make in "us, and what alterations are made in the reflections of light by the difference of "the sensible figure of bodies; the judgment presently, by a habitual custom, al"ters the appearances into their causes; so that, from that which truly is variety

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[*] [It is clear, that we are following the best path in philosophy, if we endeavour to deduce the knowledge of those things which are created by God, from the knowledge of God himself; that we may acquire the most perfect kind of science, which is that of effects though their causes.]

There is, I believe, reason to doubt if Des-Cartes had ever read the works of Bacon.

"of shadow or colour, collecting the figure, it makes it pass for a mark of figure, and frames to itself the perception of a convex figure, and an uniform colour; when the idea we receive from thence is only a plane variously coloured; as is evident in painting." Chap. ix. § 8.

"But this is not, I think, usually in any of our ideas but those received by sight; because sight, the most comprehensive of all our senses, conveying to our minds the ideas of light and colours, which are peculiar only to that sense, and also the far different ideas of space, figure, and motion, the several varieties whereof change the appearances of its proper object, viz. light and colours, we bring ourselves by use to judge of the one by the other. This, in many cases, by a settled habit in things whereof we have frequent experience, is performed so constantly, and so quick, that we take that for the perception of our sensation, which is an idea formed by our judgment; so that one, viz. that of sensation, serves only to excite the other, and is scarce taken any notice of itself; as a man who reads or hears with attention and understanding, takes little notice of the characters or sounds, but of the ideas that are excited in him by them.

"Nor need we wonder that this is done with so little notice, if we consider how very quick the actions of the mind are performed; for as itself is thought to take up no space, to have no extension, so its actions seem to require no time, but many of them seem to be crowded into an instant. I speak this in comparison to the actions of the body. Any one may easily observe this in his own thoughts, who will take the pains to reflect on them. How, as it were in an instant, do our minds, with one glance, see all parts of a demonstration, which may very well be called a long one, if we consider the time it will require to put it into words, and step by step shew it to another? Secondly, we shall not be much surprised that this is done in us with so little notice, if we consider how the facility which we get of doing things by a custom of doing, makes them often pass in us without our notice. Habits, especially such as are begun very early, come at last to produce actions in us, which often escape our observation. How frequently do we in a day cover our eyes with our eye-lids, without perceiving that we are at all in the dark? Men that by custom have got the use of a bye-word, do almost in every sentence pronounce sounds, which, though taken notice of by others, they themselves neither hear nor observe; and, therefore it is not so strange that our mind should often change the idea of its sensation into that of its judgment, and make one serve only to excite the other, without our taking notice of it."—Ibid. § 9, 10.

The habit mentioned by Locke, in this paragraph, of occasionally winking with the eye-lids, (which is not accompanied with any memory of our being, in every such instance, in a momentary state of total darkness,) deserves to be added to the cases already mentioned, to shew the dependence of memory upon attention.

Note (F.) page 94.

"———Platoni quid idea sit, peculiari tractatione prolixe excussimus,[*] quae consuli ab iis debet, qui accurate totam rei seriem pernoscere cupiunt. Nos pro præsentis instituti modo paucis notamus, Platoni ideam non esse illam, quæ ex contemplatione objectorum singularium exsurgit notionem universalem reique alicujus generalem conceptum, quem recentiores ideam vocant, ille [illegible] vocavit et ab idea distinxit. Sed ideae sunt illi essentialia rerum omnium singularium exemplaria, αυτοουσια gaudentia, ad quorum naturam indolemque res singulares formatae sunt, et quae illis veram certamque atque stabilem essentiam largiuntur. Has ideas ex divina mente oriri, inque ea radicari, sua autem propria substantia gaudere, et esse αυτως και οντως οντα statuit, et circa earum cognitionem versari intellectum humanum, in his rerum essentiis separatim et extra materiam existentibus cognoscendis cardinem verti totius philosophiae asseruit. Ridiculum id visum Aristoteli, dari extra materiam ejusmodi essentias universales, quibus res omnes singulares essentialiter modificarentur, rato, esse haec τερετισματα et nugas otiosi ingenii, Platonemque sine causa rationeque suf-

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[*] Brucker here alludes to his work, entitled, Historia Philosophica de Ideis; which I have never had an opportunity of seeing.

“sciens haec somnia ex scholis Pythagoreorum, quae istis entibus personabant, recepisse, suoque intulisse systemati. Cum autum negare non auderet, esse in rebus formas essentiales, has ideas, sive formas, qua voce Platonicum nomen exprimere maluit, materiae ab aeterno esse impressas, et in eo latere affirmavit, et ita demum ex rationibus istis formisque seminalibus, materiam esse formatam statuit.”[*]—Bruck. Hist. Phil. iii. p. 905.

Note (G.) page 94.

The Stoics, who borrowed many of their doctrines from the other schools of philosophy, seem, in particular, to have derived their notions on this subject from some of their predecessors. Stilpo, who was of the Megaric sect, is said to have held opinions approaching nearly to those of the Nominalists.

“Stilpo universalia plane sustulit. Dicebat enim: qui hominem dicat eum neminem dicere, quod non hunc vel illum ea vox significet, nec huic magis, quam alteri conveniat.—Scilicet supponebat Stilpo, non dari hominem in abstracto, adeoque has species et genera rerum non natura existere; cum neque in hoc neque in alio homine, ille homo universalis queat ostendi. Inductione itaque facta, cum neque hunc, neque illum, neque alium hominem esse colligeret, inferebat nullum esse hominem, sicque ludendo ambigua hominis in genere sive abstracto, uti logici dicunt, et in individuo sive singulari considerati notione, incautos exagitabat. Altiora tamen hic latere putat P. Bayle, et non in solo verborum lusu substitisse Stilponem, sed universalia sive praedicabilia negavisse.—Neque prorsus est dissimile, fuisse Stilponem inter eos, qui universalia praeter nuda nomina nihil esse dicerent, quod et cynicos fecisse et alios, alibi docuimus: quorum partes postea susceperunt Abaelardi sequaces et tota nominalium secta.”[†]—Brucker, vol. i. p. 619.

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[*] [The opinion of Plato on the subject of ideas I have largely explained in a separate treatise, which may be consulted by those who are desirous to become acquainted with the whole course of his speculations. At present I shall only observe, that Plato meant by an *Idea*, not that which from the contemplation of individual objects raises an universal notion or general conception of any thing. This has been by later writers called an *Idea*, but Plato termed it εἶδος, and distinguished it from ἰδέα. Ideas, according to him, are the *essential forms* of all individual things. These exist of themselves, according to their nature and quality have been formed all individuals, and it is these only which bestow upon the latter a true and proper existance. These ideas, according to him, spring from the Divine Mind, in which they have their source, but nevertheless enjoy their own proper subsistence, and exist really and of their own nature. In the contemplation of these forms of things the Human Mind is occupied, and in the knowledge of them as existing separately and without matter, consists all that is valuable in Philosophy.

These hypotheses of universal essences, without matter, and according to which all individual things are essentially modified, appeared to Aristotle absurd; and he esteems them mere sounds, the creations of a sportive genius. He supposes that Plato received these dreams without sufficient grounds from the schools of the Pythagoreans, then filled with such notions, and adopted them into his own system. But as Aristotle dared not deny that essential forms exist in things, he asserts, that these *ideas* or *forms*, by which name he chose to call them, are impressed from eternity upon matter, and lie hidden in it; and that at length, according these seminal forms and proportions, matter has been reduced to shape.]

[†] [Stilpo clearly denied Universals. He said that *man*, and *no man*, mean the same; because the word *man* means neither this man nor that man, nor belongs to one rather than to another. He asserts, that there is no such thing as man in the abstract, and so that species and genera have no existence in nature; since neither in this nor in that man can this universal man be shown. And therefore, when by an induction he had obliged his hearers to confess, that *man* means neither this nor that man nor any individual man, he inferred that it means *no man*. Thus by a play upon words, and confounding the ideas of man in the genus and abstract with that of man in the individual or particular, as logicians speak, he puzzled the unwary. Bayle, however, is of opinion that Stilpo had a deeper

Note (H.) page 95.

"Seculo xi. Roscelinus vel Rucelinus sacerdos et philosophus Compendiensis, "ab Aristotele secessum fecit, et in Stoicorum castra ita transiit, ut statuerit, "universalia, nec ante rem, nec in re existere, nec ullam habere realem existentiam, sed esse nuda nomina et voces, quibus rerum singularium genera denotentur."*—Brucker, Hist. Phil. vol. iii. p. 906.

"Dum Porphyrius prudenter quaestionem; An universalia revera existant? "omittendam esse censet, de quà inter Platonicos et Stoicos mire decertari noverat, occasionem suppeditavit otioso Roscelini ingenio, eam novo acumine ingenii "aggrediendi definiendique."† *Ibid.* vol. iii. p. 674.

Roscelinus was a native of Brittany, and canon of Compiegne. He is much celebrated, even by his adversaries, for the acuteness and subtilty of his genius, which he displayed both in scholastical and theological controversy. He was condemned for Tritheism by a council assembled at Soissons in the year 1092. (See MOSHEIM'S *Ecclesiastical History.*) It does not appear that he ever taught in Paris, or that he gave public Lectures; but he had the honour to direct the studies and to form the philosophical opinions of Abelard, by whose means the innovations he had introduced into Dialectics obtained a very wide and rapid circulation.—(BRUCKER, vol. iii. p. 728.) He is mentioned as an Englishman, by Mallet, in his life of Bacon, and by other writers; a mistake into which they have fallen, by confounding Britain with Bretagne. Very little is known of the particulars of his life. "Primum nominalium aiunt fuisse," says Leibnitz; "*nescio* "*quem* Rucelinum Britonem."‡ *See his Dissertation de Stylo Philosophico Marii Nizolii.*

The opinion of Abelard concerning Universals, is said to have differed, in some respect, from that of his master. "Alius consistit in vocibus," says John of Salisbury, who was a scholar of Abelard, "licet hæc opinio cum Roscelino suo fere omnino jam evanuerit; alius sermones intuetur, et ad illos detorquet, quicquid alicubi de universalibus meminit scriptum. In hac autem opinione deprehensus est "Peripateticus Abelardus noster."§—*Metalog.* lib. ii. c. 17.

Of this difference between the doctrines of Roscelinus and Abelard, I find myself perfectly unable to give any account; and I am glad to find that Morhoff acknowledges his ignorance upon the same subject. "Alii fuerunt, qui universalia quaesiverunt, non tam in vocibus, quam in sermonibus integris; quod Joh. Sarisberien-

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meaning, and intended, not a play upon words, but to deny the existence of universals. Nor is it unlikely that Stilpo was amongst those who affirmed that universals are mere words, as we have shewn some of the Cynics did; whose opinions the followers of Abelard and the whole sect of the Nominalists afterwards adopted.]

* [In the eleventh century, Roselinus or Rucelinus, a priest and philosopher of Compeigne, deserted the principles of Aristotle, and passed so entirely into the Stoic camp, as to maintain that Universals have no real existence, either before things or in things, but are merely names and words by which the genus of individuals is denoted.]

† [While Porphyry wisely preferred to omit the question, whether universals exist, about which he knew the Platonists and Stoics eagerly disputed, he gave occasion to the speculative genius of Roscelinus to enter upon and discuss it with fresh acuteness and ingenuity.]

‡ [The founder of the sect of the Nominalists was, they say, Rucelinus a Breton, of whom I know very little.]

§ [Some make them to consist in words or names, though this opinion has almost entirely passed away with Roscelinus its author; some in entire discourses; and apply to these whatever they remember to have elsewhere read of universals. In this opinion, Abelard the peripatetic, our countryman, was entangled.]

"sis adscribit Petro Abelardo; quo quid intelligat ille, mihi non satis liquet."[*]—*Polyhist.* tom. ii. lib. i. cap. 13. § 2.

Absurd as these controversies may now appear, such was the prevailing taste of the twelfth century that they seduced the young and aspiring mind of Abelard from all the other pursuits which Europe then presented to his ambition.—"Ut militaris gloriae pompam," says he, "cum haereditate et praerogativa primogenitorum meorum fratribus derelinquens, Martis curiae penitus abdicarem, ut Minervae gremio educarer."[†]—*Hist. Calam. Suar.* c. I.

Among the literary men of this period, none seems to have arisen to such an eminent superiority above his age, in the liberality of his philosophical views, as John of Salisbury, the celebrated friend of archbishop Becket. In his youth he had studied at Paris under Abelard and other eminent masters, and had applied himself, with distinguished ardour and success, to the subtile speculations which then occupied the schools. After a long absence, when his mind was enlarged by more liberal and useful pursuits, and by an extensive intercourse with the world, he had the curiosity to revisit the scene of his early studies, and to compare his own acquisitions with those of his old companions. The account which he gives of this visit is strikingly characteristical, both of the writer and of his age: "Inventi sunt, qui fuerant, et ubi: neque enim ad palmam visi sunt processisse ad quaestiones pristinas dirimendas, neque propositiunculam unam adjecerant.———— ————Expertus itaque sum, quod liquido colligi potest, quia sicut dialectica alias expedit disciplinas, sic, si sola fuerit, jacet exsanguis et sterilis, &c."[‡]—*Metalog.* lib. ii. cap. 10.

The same author, speaking of the controversy between the Nominalists and the Realists, thus expresses himself: "Quæstionem de generibus et speciebus in qua laborans mundus jam senuit, in qua plus temporis consumptum est quam in acquirendo et regendo orbis imperio consumserit Cæsarea domus: plus effusum pecuniæ quam in omnibus divitiis suis possederit Crœsus. Hæc enim tamdiu multos tenuit, ut cum hoc unum tota vita quærerent, tandem nec istud, nec aliud invenirent."[§]—*De Nugis Curialium,* lib. vii. cap. 12.

Note (I.) page 104.

"————Secta Nominalium, omnium inter scholasticas profundissima, et hodiernae reformatae philosophandi rationi congruentissima; quae quum olim maximè floreret, nunc apud scholasticos quidem, extincta est. Unde conjicias decrementa potius quàm augmenta acuminis. Quum autem ipse Nizolius noster se Nominalem exsertè profiteri non dubitet prope finem capitis sexti, libri primi; et verò in realitate formalitatum et universalium evertenda nervus disputationis ejus omnis potissimum contineatur, pauca quaedam de Nominalibus subjicere operae pretium duxi. Nominales sunt, qui omnia putant esse nuda nomina praeter substantias singulares, abstractorum igitur et universalium realitatem prorsus tollunt. Primum autem nominalium aiunt fuisse nescio quem Ruceli-

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[*] [There were others who sought universals, not so much in words as in entire discourses. This opinion John of Salisbury ascribes to Abelard, but what he understands by it I know not.]

[†] [Abandoning to my brothers, together with my inheritance, the splendour of military glory, I wholly renounced all martial pursuits, that I might be brought up in the lap of Minerva.]

[‡] [I found them just where I had left them. They had not proceeded one step in resolving the ancient questions, nor had they added a single proposition. I discovered what is very easily seen, that though logic may afford assistance to other studies, it is, when confined to itself, wholly without utility.]

[§] [As to the dispute concerning genera and species, in the discussion of which the world hath fallen into a second childhood, in which more time hath been spent, than the house of the Cæsars consumed in the conquest of the world, more treasure wasted than was possessed by Crœsus; it so entirely occupied the studies of many, that after having sought it through their whole life, they remained ignorant not only of this but of every kind of knowledge.]

“ num Britonem, cujus occasione cruenta certamina in academia Parisiensi fuerunt excitata.

“ Diu autem jacuit in tenebris secta nominalium, donec maximi vir ingenii, et eruditionis pro illo aevo summae, Wilhelmus Occam, Anglus, Scoti discipulus, sed mox oppugnator maximus, de improviso eam resuscitavit ; consensere Gregorius Ariminensis, Gabr. Biel, et plerique ordinis Augustinianorum, unde et in Martini Lutheri scriptis prioribus amor nominalium satis elucet, donec procedente tempore erga omnes monachos aequaliter affectus esse cœpit. Generalis autem regula est, qua nominales passim utuntur ; entia non esse multiplicanda praeter necessitatem. Haec regula ab aliis passim oppugnatur, quasi injuria in divinam ubertatem, liberalem, potius quam parcam, et varietate ac copia rerum gaudentem. Sed, qui sic objiciunt, non satis mihi nominalium mentem cepisse videntur, quae, etsi obscurius proposita, huc redit : hypothesin eo esse meliorem, quo simpliciorem, et in causis eorum quae apparent reddendis eum optime se gerere, qui quam paucissima gratis supponat. Nam qui aliter agit, eo ipso naturam, aut potius autorem ejus Deum ineptae superfluitatis accusat. Si quis astronomus rationem phenomenorum cœlestium reddere potest paucis suppositis, meris nimirum motibus simplicibus circularibus, ejus certè hypothesis ejus hypothesi praeferenda erit qui multis orbibus varie implexis ad explicanda cœlestia indiget. Ex hac jam regula nominales deduxerunt, omnia in rerum natura explicari posse, etsi universalibus et formalitatibus realibus prorsus careatur ; qua sententia nihil verius, nihil nostri temporis philosopho dignius, usque adeo, ut credam ipsum Occamum non fuisse nominaliorem, quam nunc est Thomas Hobbes, qui, ut verum fatear, mihi plusquam nominalis videtur. Non contentus enim cum nominalibus universalia ad nomina reducere, ipsam rerum veritatem ait in nominibus consistere, ac, quod majus est, pendere ab arbitrio humano, quia veritas pendeat a definitionibus terminorum, definitiones autem terminorum ab arbitrio humano. Haec est sententia viri inter profundissimos seculi censendi, qua, ut dixi, nihil potest est nominalius.”[*]

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[*] [That of the Nominalists, the most profound of all the scholastic sects, and which approached nearest to the present improved method of philosophizing, was formerly very flourishing, but is now nearly extinct in the schools ; from which we may infer the decline, rather than the increase of genius. And since our countryman Nizolius, at the end of the sixth chapter of his first book, does not hesitate plainly to profess himself a Nominalist, and indeed, has chiefly shewn the strength of his reasoning in destroying the existence of essential forms and universals, I shall think my time not lost in giving some account of this sect. The Nominalists, then, are those who maintain that all things except individual substances, are mere words or names, and wholly deny the existence of abstracts and universals. Rucelinus a Breton, of whom I know nothing, is spoken of as the founder of this sect. At the broaching of his opinions, the most furious contests arose in the University of Paris.

The sect of the Nominalists remained long in obscurity, until a man of the greatest genius, and of an erudition remarkable at that day, unexpectedly revived it. This was William Occam, an Englishman, the disciple, but afterwards, the zealous opponent of Scotus. His opinions were adopted by Gregory of Rimini, Gabriel Biel, and many of the order of St. Augustine ; and hence sprang that attachment to this sect which is so observable in the earlier writings of Martin Luther ; though he afterwards came to dislike equally Monks of every order.

The main argument of the Nominalists is, that beings are not to be multiplied without necessity. This principle is objected to by their adversaries, as injurious to the Divine munificence, which is liberal rather than confined, and delights in copiousness and variety. But those who raise this objection seem to me not to have sufficiently to have understood the meaning of the Nominalists, which, though rather obscurely expressed, rests upon this principle, that the most simple hypothesis is the best, and that in explaining the causes of things, he is most likely to be right, who assumes as an axiom, that none are to be admitted without necessity. For he who does otherwise, imputes to nature, or rather to its author, a useless superfluity. If an astronomer can account for the phenomena of the heavenly bodies by assuming a few simple principles, as mere simple circular motions, such an hypothesis is unquestionably to be preferred to one which supposes for the purpose of explaining these phenomena, a variety of complex revolutions. From this gene-

This passage from Leibnitz has given rise to a criticism of Morhoff, which appears to me to be extremely ill-founded.—"Accenset nominalibus" (says he,) "Leibnitzius Thomam Hobbesium, quem ille ipso Occamo nominaliorem, et plus-"quam nominalem vocat, qui non contentus cum nominalibus universalia ad no-"mina reducere, ipsam rerum veritatem ait in nominibus consistere, ac quod ma-"jus est, pendere ab arbitrio humano. Quae bella ejus sententia, quamquam lau-"dat eam Leibnitzius, monstri aliquid alit, ac plane nequam est. Immania enim "ex uno summo paradoxo fluunt absurda."*—MORHOF. *Polyhistor.* vol. ii. page 81.

I shall not at present enter into a particular examination of the doctrine here ascribed to Hobbes, which I shall have occasion to consider afterwards under the article of Reasoning. I cannot, however, help remarking that nothing but extreme inattention to the writings of Leibnitz, could have led Morhoff to suppose, that he had given his sanction to such an opinion. In the very passage which has now been quoted, the expression ("qui, ut verum fatear, mihi plusquam nominalis videtur") plainly implies a censure of Hobbes's philosophy; and in another dissertation intitled, *Meditationes de Cognitione, Veritate, et Ideis*, he is at pains directly to refute this part of his system:—"Atque ita habemus quoque discrimen inter de-"finitiones nominales, quæ notas tantum rei ab aliis discernendæ continent, et re-"ales, ex quibus constat rem esse possibilem, et hac ratione satisfit Hobbio, qui "veritates volebat esse arbitrarias, quæ ex definitionibus nominalibus penderent; "non considerans realitatem definitionis in arbitrio non esse, nec quaslibet no-"tiones inter se posse conjungi. Nec definitiones nominales sufficiunt ad perfec-"tam scientiam, nisi quando aliunde constat rem definitam esse possibilem, &c. &c."†—LEIBNITZII *Opera, Edit. Dutens*, tom. ii. p. 16. 17.

Note (K.) page 107.

"To form a clear notion of truth, it is very necessary to consider truth of thought, "and truth of words, distinctly one from another: but yet it is very difficult to "treat of them asunder: because it is unavoidable, in treating of mental proposi-"tions, to make use of words: and then the instances given of mental propositions "cease immediately to be barely mental, and become verbal. For a mental pro-"position being nothing but a bare consideration of the ideas, as they are in our "minds stripped of names, they lose the nature of purely mental propositions, as "soon as they are put into words.

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ral rule the Nominalists have argued, that all things in nature may be explained without having recourse to Universals and essential Forms. Than this, no opinion is more just, none more worthy a philosopher of our day; insomuch that I am of opinion that Occam himself was not more a Nominalist than is now Thomas Hobbes, who, indeed, to speak the truth, appears to me to have gone beyond the Nominalists: for, not content with reducing universals to words, he asserts that truth itself consists in words, and even depends upon the arbitrary will of man; because truth depends on the definitions of terms, and these upon the arbitrary will of man. This is the opinion of a man who is justly esteemed amongst the most profound of his age; than which, as I have said, no opinion can be more conformable to the principles of the Nominalists.]

* [Leibnitz ranks among the Nominalists, Thomas Hobbes, whom he calls "more a Nominalist than Occam himself," and speaks of him "as having gone beyond the Nominalists;" for not satisfied with them to reduce Universals to words, he affirms that truth itself consists in words, and what is more, depends on the human will; which pretty opinion of his, although praised by Leibnitz, is monstrous and abominable. From this grand paradox flow the most revolting absurdities.]

† [And thus we perceive the distinctions between the definitions of the Nominalists, which indicate only the marks of separation between individuals, and those of the Realists, who assert the existence of Universals; and this distinction is approved by Hobbes, who affirms that truths are arbitrary, as depending on the definitions of words. But he does not reflect, that the justice of the definition is not arbitrary, and that to compel the agreement of all ideas with each other, is not possible; nor are the definitions of words sufficient to produce perfect knowledge; unless we farther prove the existence of the thing defined.]

“ And that which makes it yet harder to treat of mental and verbal propositions separately, is, that most men, if not all, in their thinking and reasonings within themselves, make use of words instead of ideas, at least when the subject of their meditation contains in it complex ideas.”—LOCKE, book iv. c. 5. § 3, 4.

“ ———— But to return to the consideration of truth. We must, I say, observe two sorts of propositions, that we are capable of making.

“ First, mental, wherein the ideas in our understandings are without the use of words put together or separated by the mind, perceiving or judging of their agreement or disagreement.

“ Secondly, verbal propositions, which are words, the signs of our ideas, put together or separated in affirmative or negative sentences, &c.” *Ibid.* § 5.

“ Though the examining and judging ideas by themselves, their names being quite laid aside, be the best and surest way to clear and distinct knowledge; yet through the prevailing custom of using sounds for ideas, I think it is very seldom practised. Every one may observe, how common it is for names to be made use of, instead of the ideas themselves, even when men think and reason within their own breasts: especially if the ideas be very complex, and made up of a great collection of simple ones. This makes the consideration of words and propositions so necessary a part of the treatise of knowledge, that it is very hard to speak intelligibly of the one, without explaining the other.

“ All the knowledge we have, being only of particular or of general truths, it is evident that whatever may be done in the former of these, the latter can never be well made known, and is very seldom apprehended, but as conceived and expressed in words.” Book iv. c. 6. § 1, 2.

From these passages it appears, that Locke conceived the use which we make of words in carrying on our reasonings, both with respect to particular and general truths, to be chiefly the effect of custom; and that the employment of language, however convenient, is not essential to our intellectual operations. His opinion therefore did not coincide with that which I have ascribed to the Nominalists.

On the other hand, the following passage shews clearly, how widely his opinion differed from that of the Realists; and indeed it would have led us to believe that it was the same with Berkeley's, had not the foregoing quotations contained an explicit declaration of the contrary.

“ To return to general words, it is plain, by what has been said, that general and universal belong not to the real existence of things, but are the inventions and creatures of the understanding, made by it for its own use, and concern only signs, whether words or ideas. Words are general, as has been said, when used for signs of general ideas, and so are applicable indifferently to many particular things; and ideas are general, when they are set up as the representatives of many particular things: but universality belongs not to things themselves, which are all of them particular in their existence; even those words and ideas which in their signification are general.—When, therefore, we quit particulars, the generals that rest are only creatures of our own making; their general nature being nothing but the capacity they are put into by the understanding, of signifying or representing many particulars. For the signification they have, is nothing but a relation that by the mind of man is added to them.” Book iii. c. 3. § 11.

On the whole, it is evident, that Mr. Locke was neither completely satisfied with the doctrine of the Nominalists, nor with that of the Realists; and therefore I think it is with good reason, that Dr. Reid has classed him with the Conceptualists. Indeed, Mr. Locke has put this matter beyond all doubt himself; for, in explaining the manner in which we conceive universals, he has stated his opinion in the strongest and most paradoxical and most contradictory terms. The ridicule bestowed on this part of his philosophy by the Author of Martinus Scriblerus, although censured for unfairness by Dr. Warburton, is almost justified by some of his expressions.

Note (L.) page 112.

In a letter from Leibnitz to a Scotch gentleman (Mr. Burnet of Kemney) dated in the year 1697, there is the following passage:

“ J'ay consideré avec attention le grand ouvrage du charactere réel, et langage philosophique de Monsieur Wilkins. Je trouve qu'il y a mis une infinité de belles

" choses, et nous n'avons jamais eu une table des predicamens plus accomplie.
" Mais l'application pour les characteres, et pour la langue, n'est point conforme à
" ce qu'on pouvoit et devoit faire. J'avois consideré cette matiere avant le livre
" de Monsieur Wilkins, quand j'etois un jeune homme de dix neuf ans, dans mon
" petit livre *de arte combinatoria*, et mon opinion est que ces characteres veritable-
" ment réels et philosophiques doivent repondre a l'analyse des pensées. Il est
" vray que ces characteres presupposent la veritable philosophie, et ce n'est que
" presentement que j'oserois entrependre de les fabriquer. Les objections de M.
" Dalgarus, et de M. Wilkins, contre la methode veritablement philosophique, ne
" sont que pour excuser l'imperfection de leurs essais, et marquent seulement les
" difficultés qui les en ont rebutés."*

The letter of which this is a part, was published at the end of *A Defence of Dr.* CLARKE, (which I believe is commonly ascribed to Dr. Gregory Sharpe,) and which was printed at London in 1744. The person mentioned by Leibnitz under the name of M. Dalgarus, was evidently *George Delgarno*, a native of Aberdeen, and author of a small and very rare book, entitled, " *Ars Signorum, vulgò char-*
" *acter universalis et lingua philosophica, qua poterunt homines diversissimorum*
" *idiomatum, spatio duarum septimanarum, omnia animi sui sensa, (in rebus fa-*
" *miliaribus,) non minus intelligibiliter, sive scribendo, sive loquendo, mutuo com-*
" *municare, quam linguis propriis vernaculis. Præterea, hinc etiam poterunt ju-*
" *venes, philosophiæ principia, et veram logicæ praxin, citius et facilius multo imbi-*
" *bere, quam ex vulgaribus philosophorum scriptis.*"†

It is very remarkable that this work of Dalgarno is never (at least as far as I recollect) mentioned by Wilkins; although it appears from a letter of Charles I. prefixed to Dalgarno's book, that Wilkins was one of the persons who had recommended him to the royal favour.

The Treatise *de Arte Combinatoria* is published in the second volume of Dutens' edition of Leibnitz's works, but it does not appear to me to throw much light on his views with respect to a philosophical language.

I must request the indulgence of the reader for adding to the length of this note, by quoting a passage from another performance of Leibnitz; in which he has fallen into a train of thought remarkably similar to that of Mr. Hume and Dr. Campbell, in the passages already quoted from them in this section. The performance is entitled, *Meditationes de Cognitione, Veritate et Ideis*, and is printed in the second volume of Dutens' edition.

" Plerumque autem, praesertim in analysi longiore, non totam simul naturam
" rei intuemur, sed rerum loco signis utimur, quorum explicationem in praesenti
" aliqua cogitatione, compendii causa, solemus praetermittere, scientes aut creden-
" tes nos eam habere in potestate: ita cum chiliogonum, seu polygonum mille
" aequalium laterum cogito, non semper naturam lateris, et aequalitatis, et mille-
" narii (seu cubi a denario) considero, sed vocabulis istis (quorum sensus obscure
" saltem, atque imperfecte menti obversatur) in animo utor, loco idearum, quas de

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* [I have considered with attention the great work of Wilkins on a Real character and Philosophical language. I find in it a multitude of fine things, and we have never had a more complete table of positions. But the application to characters and language is not such as might and ought to have been effected. I had treated of this matter before the book of Mr. Wilkins, when a young man of nineteen, in my little work on *The Art of Combination;* and my opinion is, that characters, real and philosophical, ought to conform to the analysis of the thoughts. It is true, such characters presuppose a just philosophy, and I should not at present dare to construct them. The objections of Wilkins and Dalgarno against this truly philosophical method, serve only to excuse the imperfections of their attempts, and to mark the difficulties which have deterred them.]

† [*The Art of Signs, commonly called The Universal Character and Philosophical Language, by means of which persons of different languages will be enabled, in the space of two weeks, to communicate to each other in common affairs, all their thoughts, either in writing or conversation, and not less intelligibly than in their vernacular tongues. Moreover, by means of this art, young students will be able to learn the elements of philosophy and the true exercise of logic, much more easily and in a shorter time than from the usual writings of philosophers.*]

“ iis habeo, quoniam memini me significationem istorum vocabulorum habere, explicationem autem nunc judico necessariam non esse; qualem cogitationem caecam, vel etiam symbolicam appellare soleo, qua et in algebra, et in arithmetica utimur, imo fere ubique. Et certe cum notio valde composita est, non possumus omnes ingredientes eam notiones simul cogitare: ubi tamen hoc licet, vel saltem in quantum licet, cognitionem voco intuitivam. Notionis distinctae primitivae non alia datur cognitio quam intuitiva, ut compositarum plerumque cogitatio non nisi symbolica est.

“ Ex his jam patet, nos eorum quoque, quae distincte cognoscimus, ideas non percipere, nisi quatenus cogitatione intuitiva utimur. Et sane contingit, ut nos saepe falso credamus habere in animo ideas rerum, cum falso supponimus aliquos terminos, quibus utimur, jam a nobis fuisse explicatos: nec verum aut certe ambiguitati obnoxium est, quod aiunt aliqui, non posse nos de re aliqua dicere, intelligendo quod dicimus, quin ejus habeamus ideam. Saepe enim vocabula ista singula utcunque intelligimus, aut nos antea intellixisse meminimus, quia, tamen hac cogitatione caeca contenti sumus, et resolutionem notionum non satis prosequimur, fit ut lateat nos contradictio, quam forte notio composita involvit.”[*]

Note (M) page 122.

As the passage quoted in the text is taken from a work which is but little known in this country, I shall subjoin the original.

“ Qu'il me soit permis de présenter à ceux qui refusent de croire à ces perfectionnemens successifs de l'espèce humaine, un exemple pris dans les sciences où la marche de la vérité est la plus sûre, où elle peut être mesurée avec plus de précision. Ces vérités élémentaires de géométrie et d'astronomie qui avoient été dans l'Inde et dans l'Egypte une doctrine occulte, sur laquelle des prêtres ambitieux avoient fondé leur empire, étoient dans la Grèce, au temps d'Archimède ou d'Hipparque, des connoissances vulgares enseignées dans les écoles communes. Dans le siècle dernier, il suffisoit de quelques années d'étude pour savoir tout ce qu'Archimède et Hipparque avoient pu connoître; et aujourd'hui deux années de l'enseignement d'un professeur vont au-delà de ce que savoient Leibnitz ou

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[*] [But for the most part, especially in the longer analysis, we do not contemplate at once the whole nature of any thing, but instead of things we make use of signs, the explanation of which, in any immediate investigation, we are accustomed for the sake of brevity to pass over, knowing or at least believing that we have it within our command. So when I think of the thousand equal sides of a chiliogon or polygon, I do not always distinctly reflect upon the nature of a side, their equality, or the property of each as being the thousandth, or the cube of ten, but I use these words, the meaning of which is present to my mind, though perhaps obscurely and imperfectly, instead of the ideas they denote; recollecting that I well know the signification of these terms, but judging the explanation of them for the present unnecessary. This kind of contemplation I am wont to call obscure or even symbolical, which yet we use in algebra, arithmetic, and indeed in almost every thing. And indeed when an idea is very complex, we cannot at the same instant think of all the simple ideas of which it consists. Where this is possible, at least as far as it is possible, I call that intuitive thought. Of a simple primitive idea, there can be no conception but what is intuitive, as of complex ideas it is for the most part only symbolical.

From these premises it is clear, that of those things which we clearly understand, we cannot receive ideas, except so far as we make use of intuitive thought. And indeed, it sometimes happens, that we erroneously believe we have in the mind ideas of things, when we are mistaken in supposing that some terms which we make use of have been explained: nor is that true, at least it may be doubted, which some assert, that we cannot speak of any thing understandingly, unless we have at the same time an idea or notion of it. For as we often understand these single words in part only, or remember that we have understood them heretofore, because we have been content with an indistinct reflection, and have not sufficiently examined the analysis of our ideas, it may happen that some contradiction lies concealed, which is involved in the complex idea.]

“ Newton. Qu'on médite cet exemple, qu'on saisisse cette chaîne qui s'étend d'un
“ prêtre de Memphis à Euler, et remplit la distance immense qui les sépare ; qu'on
“ observe à chaque époque la génie devançant le siecle présent, et la médiocrité at-
“ teignant à ce qu'il avoit découvert dans celui qui précédoit, on apprendra que la
“ nature nous a donné les moyens d'épargner le temps et de ménager l'attention, et
“ qu'il n'existe aucune raison de croire que ces moyens puissent avoir un terme.
“ On verra qu'au moment où une multitude de solutions particulieres, de faits
“ isolés commencent à épuiser l'attention, à fatiguer la mémoire, ces théories dis-
“ persées viennent se perdre dans une méthode générale, tous les faits se réunir dans
“ un fait unique, et que ces généralisations, ces réunions répétées n'ont, comme les
“ multiplications successives d'un nombre par lui-même, d'autre limite qu'un infini
“ auquel il est impossible d'atteindre.”—*Sur l'Instruction publique, par* M. Condorcet.

Continuation of Note (M.) (Second Edition.)

How much is it to be regretted, that a doctrine so pleasing, and, at the same time, so philosophical, should have been disgraced by what has been since written by Condorcet and others, concerning the Perfectibility of Man, and its probable effect in banishing from the earth, Vice, Disease, and Mortality! Surely they who can reconcile their minds to such a Creed, might be expected to treat with some indulgence the credulity of the multitude. Nor is it candid to complain of the slow progress of Truth, when it is blended with similar extravagancies in Philosophical Systems.

While, however, we reject these absurdities, so completely contradicted by the whole analogy of human affairs, we ought to guard with no less caution against another Creed, much more prevalent in the present times;—a Creed, which taking for granted that all things are governed by chance or by a blind destiny, overlooks the beneficent arrangement made by Providence for the advancement and for the diffusion of useful knowledge; and, in defiance both of the moral suggestions and of the universal experience of mankind, treats with ridicule the supposed tendency of truth and justice to prevail finally over falsehood and iniquity. If the doctrine which encourages these favourable prospects of the future fortunes of our race, leads, when carried to an extreme, to paradox and inconsistency; the system which represents this doctrine, even when stated with due limitations, as altogether groundless and visionary, leads, by a short and inevitable process, to the conclusions either of the Atheist or of the Manichæan. In the midst, indeed, of such scenes of violence and anarchy as Europe has lately witnessed, it is not always easy for the wisest and best of men to remain faithful to their principles and their hopes: But what must be the opinions and the views of those, who, during these storms and convulsions of the Moral World, find at once, in the apparent retrogradation of Human Reason, the gratification of their Political Ambition, and the secret triumph of their Sceptical Theories?———

Fond, impious Man! Think'st thou yon Sanguine Cloud,
Rais'd by thy breath, has quench'd the Orb ot Day?
To morrow, he repairs the golden flood,
And warms the Nations with redoubled ray.

Note (N.) page 187.

It may be proper to remark that under the title of *Economists*, I comprehend not merely the disciples of *Quesnai*, but all those writers in France, who, about the same time with him, began to speculate about the natural order of political societies; or, in other words, about that order which a political society would of itself gradually assume, on the supposition that law had no other object than to protect completely the natural rights of individuals, and left every man at liberty to pursue his own interest in his own way, as long as he abstained from violating the rights of others. The connexion between this natural order and the improvement of mankind, has been more insisted on by the biographers of Turgot than by any other authors; and the imperfect hints which they have given of the views of that truly great man upon this important subject, leave us much room to regret that he had not leisure to execute a work, which he appears to have lóng meditated, on the principles of moral and political philosophy.

Vie de M. Turgot. *Partie* ii. p. 53.

It is merely for want of a more convenient expression that I have distinguished these different writers by the title of *Economists*. It is in this extensive sense that the word is commonly understood in this country; but I am sensible that it is somewhat ambiguous, and that, without the explanation which I have given, some of my observations might have been supposed to imply a higher admiration than I really entertain of the writings of M. Quesnai, and of the affected phraseology employed by his sect.

The connexion between M. Turgot and M. Quesnai, and the coincidence of their opinions about the most essential principles of legislation, will I hope justify me in ranking the former with the Oeconomists; although his views seem to have been much more enlarged than those of his contemporaries; and although he expressly disclaimed an implicit acquiescence in the opinions of any particular sect.

" M. Turgót étudia la doctrine de M. Gournay et de M. Quesnai, en profita, se
" la rendit propre; et la combinant avec la connoissance qu'il avoit du Droit, et
" avec les grandes vues de législation civile et criminelle qui avoient, occupé sa
" tête et intéressé son cœur, parvint à en former sur le gouvernement des nations
" un corps de principes à lui, embrassant les deux autres, et plus complet en-
" core."[*]

Mémoires sur la Vie et les Ouvrages de M. Turgot, *par* M. Dupont, *p.* 40, 41.

" Il a passé pour avoir été attaché à plusieurs sectes, ou à plusieurs société qu'on
" appelait ainsi; et les amis qu'il avait dans ces socités diverses lui reprochaient
" sans cesse de n'être pas de leur avis; et sans cesse il leur reprochait de son côté
" de vouloir faire communauté d'opinions, et de se rendre solidaires les uns pour
" les autres. Il croyait cette marche propre à retarder les progrés mêmes de leurs
" découvertés."[†]—*Ibid. p.* 41, 42.

Note (O.) page 194.

The foregoing observations on the state of the mind in sleep, and on the phenomena of dreaming, were written as long ago as the year 1772; and were read (nearly in the form in which they are now published) in the year 1773, in a private literary society in this university. A considerable number of years afterwards, at a time when I was occupied with very different pursuits, I happened, in turning over an old volume of the Scots Magazine (the volume for the year 1749,) to meet with a short essay on the same subject, which surprised me by its coincidence with some ideas which had formerly occurred to me. I have reason to believe that this essay is very little known, as I have never seen it referred to by any of the numerous writers who have since treated of the human mind; nor have even heard it once mentioned in conversation. I had some time ago the satisfaction to learn accidentally, that the author was Mr. Thomas Melville, a gentleman who died at the early age of 27; and whose ingenious observations on light and colours (published in the Essays of the Edinburgh Philosophical Society) are well known over Europe.

The passages which coincide the most remarkably with the doctrine I have stated, are the following. I quote the first with particular pleasure, on account of the support which it gives to an opinion which I formerly proposed in the essay on Conception, and on which I have the misfortune to differ from some of my friends.

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[*] [Mr. Turgot studied the doctrine of Messrs. Gournay and Quesnai, profited by it, made it his own, and combining with it the knowledge he had of Public Law, and with the great views of civil and criminal legislation which had occupied his thoughts and interested his feelings, came at length to form from them a body of principles of his own, embracing those of the two others, and still more complete.]

[†] [He passed for being a member of many sects, or rather of many societies to which they gave that appellation, and the friends whom he possessed in these different societies, reproached him continually with not being of their party. In his turn, he accused them of wishing to establish a community of opinions, and to become bound for each other. He thought this conduct necessary to retard the progress itself of their discoveries.]

“When I am walking up the High-street of Edinburgh, the objects which strike my eyes and ears give me an idea of their presence; and this idea is lively, full, and permanent, as arising from the continued operation of light and sound on the organs of sense.

“Again, when I am absent from Edinburgh, but *conceiving* or *imagining* myself to walk up the High-street, in relating, perhaps, what befel me on such an occasion, I have likewise in my mind an idea of what is usually seen and heard in the High-street; and this idea of imagination is entirely similar to those of sensation, though not so strong and durable.

“In this last instance, while the imagination lasts, be it ever so short, it is evident that I *think* myself in the street of Edinburgh, as truly as when I *dream* I am there, or even as when I *see* and *feel* I am there. It is true, we cannot so well apply the word *belief* in this case; because the *perception* is not clear or steady, being ever disturbed, and soon dissipated, by the superiour strength of intruding sensations: yet nothing can be more absurd than to say, that a man may, in the same individual instant, *believe* he is in one place, and *imagine* he is in another. No man can demonstrate that the objects of sense exist without him; we are conscious of nothing but our own sensations: however, by the uniformity, regularity, consistency, and steadiness of the impression, we are led to believe, that they have a real and durable cause without us; and we observe not any thing which contradicts this opinion. But the ideas of imagination, being transient and fleeting, can beget no such opinion, or habitual belief; though there is as much perceived in this case as in the former, namely, an idea of the object within the mind. It will be easily understood, that all this is intended to obviate an objection that might be brought against the similarity of dreaming and imagination, from our believing in sleep that all is real. But there is one fact, that plainly sets them both on a parallel, that in sleep we often recollect that the scenes which we behold are a mere dream, in the same manner as a person awake is habitually convinced that the representations of his imagination are fictitious.”

——“In this essay we make no inquiry into the state of the body in sleep.”

——“If the operations of the mind in sleep can be fairly deduced from the same causes as its operations when awake, we are certainly advanced one considerable step, though the causes of these latter should be still unknown. The doctrine of gravitation, which is the most wonderful and extensive discovery in the whole compass of human science, leaves the descent of heavy bodies as great a mystery as ever. In philosophy, as in geometry, the whole art of investigation lies in reducing things that are difficult, intricate, and remote, to what is simpler and easier of access, by pursuing and extending the analogies of nature.”

On looking over the same essay, I find an observation which I stated as my own in page 86 of this work. “The mere imagination of a tender scene in a romance, or drama, will draw tears from the eyes of those who know very well, when they recollect themselves, that the whole is fictitious. In the mean time they must conceive it as real; and from this supposed reality arises all its influence on the human mind.”

Continuation of Note (O.) (Second Edition.)

Soon after the publication of the First Edition of this Work, a difficulty was started to me with respect to my conclusions, concerning the state of the mind in sleep, by my excellent friend Mr. Prévost of Geneva; a gentleman who has long held a high rank in the republic of letters, and to whose valuable correspondence I have often been indebted for much pleasure and instruction. The same difficulty was proposed to me, nearly about the same time, by another friend (then at a very early period of life,) who has since honourably distinguished himself by his observations on Dr. Darwin's Zoonomia; the first fruits of a philosophical genius, which, I trust, is destined for yet more important undertakings.*

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* Observations on the Zoonomia of Dr. Darwin. By Thomas Brown, Esq. Edinburgh, 1798

As Mr. Prévost has, in the present instance, kindly aided me in the task of removing his own objection, I shall take the liberty to borrow his words:

“ Sans l'action de la Volonté point d'effort d'attention. Sans quelque effort d'attention point de Souvenir. Dans le Sommeil, l'action de la Volonté est suspendue. Comment donc reste-t-il quelque Souvenir des Songes?

“ Je vois bien deux où trois réponses à cette difficulté. Quant à présent, elles se réduisent à dire, ou que dans un Sommeil parfait, il n'y a nul Souvenir, et que là où il y a Souvenir, le Sommeil n'étoit pas parfait; ou que l'action de la Volonté qui suffit pour le Souvenir n'est pas suspendue dans le Sommeil; que ce degré d'activité reste à l'ame; que ce n'est, pour ainsi dire qu'une Volonté élémentaire et comme insensible."[*]

I am abundantly sensible of the force of this objection; and am far from being satisfied, that it is in my power to reconcile completely the apparent inconsistency. The general conclusions, at the same time, to which I have been led, seem to result so necessarily from the facts I have stated, that even although the difficulty in question should remain for the present unsolved, it would not, in my opinion, materially affect the evidence on which they rest. In all our inquiries, it is of consequence to remember, that when we have once arrived at a general principle by a careful induction, we are not entitled to reject it, because we may find ourselves unable to explain from it, synthetically, all the phenomena in which it is concerned. The Newtonian Theory of the Tides is not the less certain, that some apparent exceptions occur to it, of which it is not easy (in consequence of our imperfect knowledge of the local circumstances by which, in particular cases, the effect is modified) to give a satisfactory explanation.

Of the solutions suggested by Mr. Prevost, the first coincides most nearly with my own opinion; and it approaches to what I have hinted (in page 84 of this work) concerning the seeming exceptions to my doctrine, which may occur in those cases where sleep is partial. A strong confirmation of it, undoubtedly, may be derived from the experience of those persons (several of whom I have happened to meet with) who never recollect to have dreamed, excepting when the soundness of their sleep was disturbed by some derangement in their general health, or by some accident which excited a bodily sensation.

Another solution of the difficulty might perhaps be derived from the facts (stated in page 62 of this volume) which prove, “ that a perception, or an idea, which passes through the mind without leaving any trace in the memory, may yet serve to introduce other ideas connected with it by the Laws of Association."

From this principle it follows, that if any one of the more remarkable circumstances in a dream should recur to us after we awake, it might (without our exerting during sleep that attention which is essential to memory) revive the same concatenation of particulars with which it was formerly accompanied. And what is a dream, but such a concatenation of *seeming events* presenting itself to the imagination during our waking hours; the origin of which we learn by experience to refer to that interval which is employed in sleep;—finding it impossible to connect it with any specific time or place in our past history? One thing is certain, that we cannot, by any direct acts of recollection, recover the train of our sleeping thoughts, as we can, in an evening, review the meditations of the preceding day.

Another cause, it must be owned, presents an obstacle to such efforts of recollection; and is, perhaps, adequate of itself to explain the fact. During the day, we have many aids to memory which are wanting in sleep (those, in particular, which are furnished by the objects of our external senses;) and of these aids we never fail to avail ourselves, in attempting to recollect the thoughts in which the day has been spent. We consider, in what PLACE we were at a particular time, and what persons and things we there saw; endeavouring thus to lay hold of our intellectual processes, by means of the sensible objects with which they were associated: and yet, with all these advantages, the account which most men are able to give of their meditations at the close of a long summer's day, will not be found to require many sentences. As in sleep, our communication with the external world is completely interrupted, it is not surprising, that the memory of our dreams should be much more imperfect than that of our waking thoughts; even supposing us to bestow, at the moment, an equal degree of attention on both.

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[*] [Without the action of the Will there can be no effort of attention; without some effort of attention, no recollection. In sleep the action of the will is suspended. How then can there remain any remembrance of dreams?

I see clearly two or three solutions of this difficulty. They may be reduced to these; either that in perfectly sound sleep there is no remembrance, and where there is remembrance the sleep was not sound; or that the action of the will which was sufficient for remembrance is not suspended in sleep, that such a degree of activity remains in the soul; that it is only, if I may so speak, an imperfect and inefficient will.]

It is of more importance to remark, in the present argument, that those persons who are subject to *Somnambulism*, seldom, if ever, retain any recollection of the objects of their perceptions, while under the influence of this disorder. If the principles I have endeavoured to establish be just, this is a necessary consequence of their inattention to what then passes around them; an inattention of which nobody can doubt, who has had an opportunity of witnessing the vacant and unconscious stare which their eyes exhibit. The same fact illustrates strongly the suspension, during sleep, of those voluntary powers, to which the operations both of mind and body are at other times subjected.

These considerations derive additional evidence from a common remark, that idle people are most apt to dream, or, at least, to recollect their dreams. The thoughts of the busy and of the studious are directed by their habitual occupations into a particular channel; and the spontaneous course of their ideas is checked, and turned aside, by the unremitted activity of their minds. In the heedless and dissipated, the thoughts wander carelessly from object to object, according to the obvious relations of resemblance and of analogy, or of vicinity in place and time. As these are the prevailing principles of association in sleep, the chances that the dreams of such men shall be again presented to them in the course of the following day, are infinitely multiplied.

Which of these solutions approaches most nearly to the real state of the fact, I do not presume to decide. I think it probable, that both of them are entitled to notice, in comparing the phenomena of dreaming with the general principles to which I have endeavoured to refer them. In cases where our dreams are occasioned by bodily sensations, or by bodily indisposition, it may be expected that the disturbed state of our rest will prevent that total cessation of the power of attention, which takes place when sleep is profound and complete; and, in such instances, the attention which is given to our passing thoughts, may enable us afterwards to retrace them by an act of recollection. On the other hand, the more general fact unquestionably is, that at the moment of our awaking, the interval spent in sleep presents a total blank to the memory; and yet, it happens not unfrequently, that, at the distance of hours, some accidental circumstance occurring to our thoughts, or suggested to us from without, revives a long train of particulars associated in the mind with each other; to which train (not being able to account otherwise for the concatenation of its parts) we give the name of a *Dream.*

After all, I am very far from supposing that I have exhausted this subject; and I shall be fully satisfied with the success of my inquiries, if those who are qualified to distinguish between legitimate and hypothetical theories shall admit, that I have pointed out the plan on which these phenomena should be studied, and have made some progress, (how small soever) towards its execution. Much additional light, I am sensible, might have been easily thrown on this part of our constitution, as well as upon many others, if I had not imposed on myself the restraint of adhering, wherever it was at all possible, to the modes of speaking employed by my predecessors in describing our mental operations.

One remark I must beg leave to recommend to the consideration of those who may hereafter engage in this research; that, among the astonishing appearances exhibited by the mind in sleep, a very large proportion are precisely analogous to those of which we are every moment conscious while awake. If the exciting causes, for example, of our Dreams seem mysterious and inscrutable, is not the fact the same with the origin of every idea or thought which spontaneously solicits our notice? The only difference is, that in the latter instance, in consequence of long and constant familiarity, they are surveyed by all with little wonder, and by most with hardly any attention. In the former instance, they rouse the curiosity of the most illiterate, from their comparative infrequency, and from the contrast which, in some respects, they present to the results of our habitual experience.——It is thus, that a peasant who has been accustomed from his infancy to see, without any emotion, the fall of heavy bodies to the ground, never fails to express the liveliest admiration when he first witnesses the powers of the loadstone.

In such cases, the researches of genuine science have a tendency to produce two moral effects equally beneficial. The one is to illustrate the unity of design in nature, by reconciling what seems, from its rarity or singularity, to be mysterious or incomprehensible, with the general laws which are familiarized to us by daily experience ; the other, to counteract the effects of familiarity in blunting our natural curiosity with respect to these laws, by leading the thoughts to some of their more curious and apparently anomalous applications.

The phenomena of Dreaming may perhaps, in this last point of view, form an article not altogether useless in the Natural History of man ; in as much as they contribute to attract our attention to those intellectual powers, from which it is so apt to be withdrawn by that external world, which affords the first, and (for the common purposes of life) the most interesting field for their exercise. In my own case, at least, this supposition has been exactly verified ; as the speculations concerning the human mind which I have ventured to present to the public, all took their rise from the subject to which this note refers. The observations which I have stated with respect to it in the text (excepting a very few paragraphs since added) were written at the age of eighteen, and formed a part of the first philosophical essay which I recollect to have attempted. The same essay contained the substance of what I have introduced in chapter third, concerning the belief accompanying conception ; and of the remarks stated in the third section of chapter fifth, on the extent of the power which the mind has over the train of its thoughts. When I was afterwards led professionally, at the distance of many years, to resume the same studies, this short manuscript was almost the only memorial I had preserved of these favourite pursuits of my early youth ; and from the views which it recalled to me, insensibly arose the Analysis I have since undertaken of our intellectual faculties in general.

For some indulgence to the egotism of this note, I must trust to the good nature of my readers. It has been lengthened much beyond my original intention, by an anxiety (not, I hope, unpardonable in an Author) to fix the date of some of my disquisitions and conclusions, of which it is highly probable I may magnify the importance beyond their just value. The situation of a public teacher, (I must beg leave to add,) by giving an immediate circulation to the doctrines he delivers, exposes him to many inconveniences which other classes of literary men have in their power to avoid.

Before concluding these remarks, I cannot help reminding my readers once more, that my fundamental principle with respect to the state of the mind in sleep is,—not, that *the power of volition* is then suspended ; but, that *the influence of the will* over the faculties both of mind and body is then interrupted. (See pp. 178, 179, 180, 181.) I mention this chiefly, in order to mark the difference between my doctrine and that maintained in Dr. Darwin's *Zoonomia*. According to this ingenious writer, " the power of volition is totally suspended in perfect sleep." (Zoonomia, vol. i. p. 315.)—" In the *Incubus*" (he observes,) " the *desire* of moving the body is " painfully exerted ; but the *power of moving it, or volition*, is incapable of action " till we awake."—(p. 288.) Would he not have stated the fact more correctly, if he had said, that *volition* is painfully exerted ; but that the power of moving the body is suspended ? In the very accurate phraseology of Mr. Locke, " *volition* is " an act of the mind, knowingly exerting that dominion it takes itself to have over " any part of the man, by employing it in, or withholding it from any particular action." This act of the mind, Dr. Darwin expresses by the word *desire ;* an indistinctness still extremely common among metaphysical writers ; although it was long ago remarked and censured by the eminent author just quoted : " I find" (says Locke,) " the *will* often confounded with *desire*, and one put for the other ; and " that by men, who would not willingly be thought, not to have very distinct notions of things, and not to have written very clearly about them." (Essay on Human Understanding, vol. i. p. 203, 13th edition.)

Note (P.) page 188.

Dr. Reid has, with great truth, observed that Des Cartes' reasonings against the existence of the secondary qualities of matter, owe all their plausibility to the ambiguity of words.—When he affirms, for example, that the smell of a rose is not in the flower but in the mind, his proposition amounts only to this, that the rose is not conscious of the sensation of smell: but it does not follow from Des Cartes' reasonings, that there is no quality in the rose which excites the sensation of smell in the mind;—which is all that any person means when he speaks of the smell of that flower. For the word *smell*, like the names of all secondary qualities, signifies two things, a sensation in the mind, and the unknown quality which fits it to excite that sensation.[*] The same remark applies to that process of reasoning by which Des Cartes attempts to prove that there is no heat in the fire.

All this, I think, will be readily allowed with respect to smells and tastes, and also with respect to heat and cold; concerning which I agree with Dr. Reid, in thinking that Des Cartes' doctrine, when cleared of that air of mystery which it derives from the ambiguity of words, differs very little, if at all, from the commonly received notions. But the case seems to be different with respect to *colours*, of the nature of which the vulgar are apt to form a very confused conception, which the philosophy of Des Cartes has a tendency to correct. Dr. Reid has justly distinguished the *quality* of colour from what he calls the *appearance* of colour, which last can only exist in a mind.[†] Now I am disposed to believe, that when the vulgar speak of colour, they commonly mean the *appearance* of colour; or rather they associate the appearance and its cause so intimately together, that they find it impossible to think of them separately.[‡] The sensation of colour never forms one simple object of attention to the mind like those of smell and taste; but every time we are conscious of it, we perceive at the same time extension and figure. Hence it is, that we find it impossible to conceive colour without extension, though certainly there is no more necessary connexion between them, than between extension and smell.

From this habit of associating the two together, we are led also to assign them the same place, and to conceive the different colours, or (to use Dr. Reid's language) the *appearance* of the different colours, as something spread over the surfaces of bodies. I own that when we reflect on the subject with attention, we find this conception to be indistinct, and see clearly that the appearance of colour can exist only in the mind: but still it is some confused notion of this sort, which every man is disposed to form who has not been very familiarly conversant with philosophical inquiries.—I find, at least, that such is the notion which most readily presents itself to my own mind.

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[*] Some judicious remarks on this ambiguity in the names of secondary qualities, are made by Malebranche:

"It is only (says he) since the time of Des Cartes, that those confused and indeterminate questions, whether fire is hot, grass green, and sugar sweet, philosophers are in use to answer, by distinguishing the equivocal meaning of the words expressing sensible qualities. If by heat, cold, and savour, you understand such and such a disposition of parts, or some unknown motion of insensible particles, then fire is hot, grass green, and sugar sweet. But if by heat and other qualities you understand what *I feel* by fire, what *I see* in grass, &c. fire is not hot, nor grass green; for the heat I feel, and the colours I see, are only in the soul."

[†] Dr. Akenside, in one of his Notes on his PLEASURES OF IMAGINATION, observes, that colours, *as apprehended by the mind*, do not exist in the body. By this qualification, he plainly means to distinguish what Dr. Reid calls the appearance of colour, from colour considered as a quality of matter.

[‡] Dr. Reid is of opinion, that the vulgar always mean to express by the word *colour*, a quality, and not a sensation. "Colour (says he) differs from other secondary qualities in this, that whereas the name of the quality is sometimes given to the sensation which indicates it, and is occasioned by it, we never, as far as I can judge, give the name of *colour* to the sensation, but to the quality only." This question is of no consequence for us to discuss at present, as Dr. Reid acknowledges in the following passage, that the sensation and quality are so intimately united together in the mind, that they seem to form only one simple object of thought. "When we think or speak of any particular colour, however simple the notion may seem to be which is presented to the imagination, it is really in some sort compounded; it involves an unknown cause and a known effect. The name of *colour* belongs indeed to the cause only, and not to the effect. But as the cause is unknown, we can form no distinct conception of it, but by its relation to the known effect. And therefore both go together in the imagination, and are so closely united that they are mistaken for one simple object of thought." *Inquiry into the Human Mind*, chap. vi. sect. 4.

Nor is this reference of the sensation, or appearance of colour, to an external object, a fact altogether singular in our constitution. It is extremely analogous to the reference which we always make, of the sensations of touch to those parts of the body, where the exciting causes of the sensations exist.—If I strike my hand against a hard object, I naturally say, that I feel pain in my hand. The philosophical truth is, that I perceive the cause of the pain to be applied to that part of my body. The sensation itself I cannot refer *in point of place* to the hand, without conceiving the soul to be spread over the body by diffusion.

A still more striking analogy to the fact under our consideration, occurs in those sensations of touch which we refer to a place *beyond the limits of the body;* as in the case of pain felt in an amputated limb.

The very intimate combination to which the foregoing observations on the sensation of colour relate, is taken notice of by D'Alembert in the *Encyclopedie,* as one of the most curious phenomena of the human mind.

" Il est très évident que le mot *couleur* ne désigne aucune propriété du corps, mais
" seulement une modification de notre ame; que le blancheur, par exemple, la
" rougeur, &c. n'existent que dans nous, et nullement dans le corps auxquels nous
" les rapportons; néanmoins par une habitude prise dès notre enfance, c'est une
" chose très singuliere et digne de l'attention des métaphysiciens, que ce penchant
" que nous avons à rapporter à une substance matérielle et divisible, ce qui appar-
" tient réellement à une substance spirituelle et simple; et rien n'est peut-être plus
" extraordinaire dans les opérations de notre ame, que de la voir transporter hors
" d'elle même et étendre, pour ainsi dire, ses sensations sur une substance à la-
" quelle elles ne peuvent appartenir."*

From the following passage in Condillac's Traité des Sensations, it appears that the phenomenon here remarked by D'Alembert, was, in Condillac's opinion, the natural and obvious effect of an early and habitual association of ideas. I quote it with the greater pleasure, that it contains the happiest illustration I have seen of the doctrine which I have been attempting to explain.

" On pourroit faire une supposition ou l'odorat apprendroit à juger parfaitement
" des grandeurs, des figures, des situations, et des distances. Il suffiroit d'un
" côté de soumettre les corpuscules odoriférans aux loix de la dioptrique, et de l'au-
" tre, de construire l'organe de l'odorat à peu près sur le modèle de celui de la
" vûe; ensorte que les rayons odoriférans, après s'être croisés à l'ouverture, frap-
" passent sur une membrane intérieure autant de points distincts qu'il y en a sur
" les surfaces d'où ils seroient réfléchis.

" En pareil cas, nous contracterions bientôt l'habitude d'étendre les odeurs sur
" les objets, et les philosophes ne manqueroient pas de dire, que l'odorat n'a pas be-
" soin des leçons du toucher pour appércevoir des grandeurs et des figures."†—*Oeuvres de* CONDILLAC.—*Edit. Amst.* vol. v. p. 223.

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* [It is very evident that the word, *colour,* does not mean any property of body, but only a modification of the soul; that white, red, &c. exist only in ourselves, and by no means in the bodies to which we refer them; nevertheless, by a habit, contracted in infancy, which is a fact very singular and worthy the attention of metaphysicians, we have a disposition to refer to a material and divisible substance, what really belongs to a substance which is spiritual and simple. And nothing perhaps is more extraordinary in the operations of the mind, than to see it transport itself without, and spread, if I may so speak, its sensations over a subject to which they cannot belong.]

† [We may raise a supposition, according to which the sense of smell might learn to judge exactly of magnitude, figure, place, and distance. It would be sufficient, on the one hand, to subject the ordorous corpuscles to the laws of dioptricks, and on the other, to construct the organ of smell upon the model in some measure of that of sight; so that the odorous rays, after crossing each other at the opening, should

Note (Q.) page 189.

"Verum quidem est, quod hodierni musici sic loqui soleant (acutum in alto re-
"putantes et grave in imo) quodque ex Graecis recentioribus nonnulli sic aliquan-
"do (sed raro) loquuti videantur; apud quos sensim inolevit mos sic loquendi.—
"Sed antiquiores Græci plane contrarium (grave reputantes in alto et acutum in
"imo.) Quod etiam ad Boethii tempora continuatum est, qui in schematismis
"suis, grave semper in summo ponit, et acutum in imo."*—DAVID GREGORY, *in Præfat. ad edit. suam Euclid. Op. Oxon.* 1703.

The association to which in modern times, we are habituated from our infancy, between the ideas of acute and high, and between those of grave and low, is accounted for by Dr. Smith, in his Harmonics, from the formation of the voice in singing; which Aristides Quintilianus thus describes: "*Γινεται δε ὁ μεν βαρυτης, κατωθεν αναφερομενου του πνευματος, ὁ δ' οξυτης επιπολης εκφερομενου*, &c. Et quidem "gravitas fit, si ex inferiore parte (gutturis) spiritus sursum feratur, acumen vero, "si per summam partem prorumpat;"† (as Meibomius translates it in his notes.)—*See* SMITH's *Harmonics*, p. 3.

Dr. Beattie, in his ingenious Essay on Poetry and Music, says, it is probable that the deepest or gravest sound was called *summa* by the Romans, and the shrillest or acutest *ima*: and he conjectures, that "this might have been owing to the "construction of their instruments; the string that sounded the former being, per-"haps, highest in place, and that which sounded the latter lowest." If this conjecture could be verified, it would afford a proof from the fact, how liable the mind is to be influenced in this respect by casual combinations.

Note (R.) page 213.

The difference between the effects of *association* and of *imagination*, (in the sense in which I employ these words,) in heightening the pleasure or the pain produced on the mind by external objects, will appear from the following remarks:

1. As far as the association of ideas operates in heightening pleasure or pain, the mind is passive: and accordingly where such associations are a source of inconvenience, they are seldom to be cured by an effort of our volition, or even by reasoning; but by the gradual formation of contrary associations. Imagination is an active exertion of the mind; and although it may often be difficult to restrain it, it is plainly distinguishable in theory from the associations now mentioned.

2. In every case in which the association of ideas operates, it is implied that some pleasure or pain is recalled which was felt by the mind before. I visit, for example, a scene where I have been once happy; and the sight of it affects me, on that account, with a degree of pleasure, which I should not have received from any other scene equally beautiful. I shall not inquire, whether, in such cases, the associated pleasure arises *immediately* upon the sight of the object, and without the intervention of any train of thought; or whether it is produced by the recollection

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strike upon an interior membrane in as many distinct points as there are upon the surface from which they might be reflected.

We should then, in like manner, soon contract a habit of spreading odours over objects, and philosophers would not fail to say, that the sense of smell needs not that of touch to enable it to perceive magnitude and figure.]

* [It is indeed true, that our modern musicians speak of the Acute as high, and the Grave as low; as some of the later Greeks have sometimes though rarely done; but the more ancient Greeks in a manner directly the reverse, considering the Grave as high, and the Acute as low; which mode of speaking remained to the time of Boethius, who, in his musical compositions, always places the grave in the highest, and the acute in the lowest scale.]

† [The low tones are formed, by drawing the breath upwards from the lower, and the high from the upper part of the throat or windpipe.]

See a learned note in Sanadon's Horace, Sat. iii. Lib 1.

and conception of former occurrences which the perception recalls. On neither supposition does it imply the exercise of that creative power of the mind to which we have given the name of Imagination. It is true, that commonly, on such occasions, imagination is busy; and our pleasure is much heightened by the colouring which she gives to the objects of memory. But the difference between the effects which arise from the operation of this faculty, and those which result from association, is not, on that account, the less real.

The influence of imagination on happiness is chiefly felt by cultivated minds. That of association extends to all ranks of men, and furnishes the chief instrument of education; in so much that whoever has the regulation of the associations of another from early infancy, is, to a great degree, the arbiter of his happiness or misery.

Some very ingenious writers have employed the word Association in so extensive a sense, as to comprehend, not only imagination, but all the other faculties of the mind. Wherever the pleasing or the painful effect of an object does not depend solely on the object itself, but arises either wholly or in part from some mental operation to which the perception of it gives rise, the effect is referred to association. And, undoubtedly, this language may be employed with propriety, if the word Association be applied to all the ideas and feelings which may arise in the mind, in consequence of the exercise which the sight of the object may give to the imagination, to the reasoning powers, and to the other principles of our nature. But in this work, and particularly in the second part of chap. v. I employ the word Association in a much more limited sense; to express the effect which an object derives from ideas or from feelings which it does not necessarily suggest, but which it uniformly recalls to the mind, in consequence of early and long continued habits.

Note (S.) page 221.

The following passage from Malebranche will be a sufficient specimen of the common theories with respect to memory.

“ In order to give an explanation of memory, it should be called to mind, that “ all our different perceptions are affixed to the changes which happen to the fibres “ of the principal parts of the brain, wherein the soul particularly resides.

“ This supposition being laid down, the nature of the memory is explained: for “ as the branches of a tree, which have continued for some time bent after a particular manner, preserve a readiness and facility of being bent afresh in the “ same manner; so the fibres of the brain, having once received certain impressions from the current of the animal spirits, and from the action of *the* objects “ upon them, retain for a considerable time some facility of receiving the same dispositions. Now the memory consists only in that promptness or facility; since “ a man thinks upon the same things, whenever the brain receives the same impressions.”*

“ The most considerable differences,” says the same Author in another passage, “ that are found in one and the same person, during his whole life, are in his infancy, in his maturity, and in his old age. The fibres in the brain in a man's childhood are soft, flexible, and delicate; a riper age dries, hardens and corroborates “ them; but in old age they grow altogether inflexible, gross, and intermixed with “ superfluous humours, which the faint and languishing heat of that age is no longer able to disperse; for as we see that the fibres which compose the flesh “ harden by time, and that the flesh of a young partridge is without dispute more “ tender than that of an old one, so the fibres of the brain of a child, or a young “ person, must be more soft and delicate than those of persons more advanced in “ years.

“ We shall understand the ground and occasion of these changes, if we consider “ that the fibres are continually agitated by the animal spirits, which whirl about “ them in many different manners: for as the winds parch and dry the earth by “ their blowing upon it, so the animal spirits, by their perpetual agitation, render “ by degrees the greatest part of the fibres of a man's brain more dry, more close, “ and solid; so that persons more stricken in age must necessarily have them al-must always more inflexible than those of a lesser standing. And as for those of the same age, drunkards, who for many years together have drank to excess either wine, or other such intoxicating liquors, must needs have them more solid and more inflexible than those who have abstained from the use of such kind of liquors all their lives."*

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* Book ii. chap. 5. (Page 54 of TAYLOR's Transl.)

Note (T.) page 255.

"Though Sir Isaac's memory was much decayed in the last years of his life, I found he perfectly understood his own writings, contrary to what I had frequently heard in discourse from many persons. This opinion of theirs might arise, perhaps, from his not being always ready at speaking on these subjects, when it might be expected he should. But as to this it may be observed, that great geniuses are frequently liable to be absent, not only in relation to common life, but with regard to some of the parts of science they are the best informed of. Inventors seem to treasure up in their minds what they have found out, after another manner than those do the same things, who have not this inventive faculty. The former, when they have occasion to produce their knowledge, are, in some measure, obliged immediately to investigate part of what they want. For this they are not equally fit at all times; so it has often happened, that such as retain things chiefly by a very strong memory, have appeared off-hand more expert than the discoverers themselves."—*Preface to* PEMBERTON'S *View of* NEWTON'S *Philosophy*.

Note (U.) page 279.

"Going over the theory of virtue in one's thoughts, talking well, and drawing fine pictures of it; this is so far from necessarily or certainly conducing to form a habit of it in him who thus employs himself, that it may harden the mind in a contrary course, and render it gradually more insensible; i. e. form a habit of insensibility to all moral obligations. For, from our very faculty of habits, passive impressions, by being repeated, grow weaker. Thoughts, by often passing through the mind, are felt less sensibly: being accustomed to danger, begets intrepidity, i. e. lessens fear; to distress, lessens the passion of pity; to instances of others' mortality, lessens the sensible apprehension of our own. And from these two observations together, that practical habits are formed and strengthened by repeated acts; and that passive impressions grow weaker by being repeated upon us; it must follow, that active habits may be gradually forming and strengthening by a course of acting upon such and such motives and excitements, whilst these motives and excitements themselves are, by proportionable degrees, growing less sensible, i. e. are continually less and less sensibly felt, even as the active habits strengthen. And experience confirms this: for active principles, at the very time they are less lively in perception than they were, are found to be, somehow, wrought more thoroughly into the temper and character, and become more effectual in influencing our practice. The three things just mentioned may afford instances of it. Perception of danger is a natural excitement of passive fear and active caution: and by being inured to danger, habits of the latter are gradually wrought, at the same time that the former gradually lessens. Perception of distress in others, is a natural excitement passively to pity, and actively to relieve it: but let a man set himself to attend to, inquire out, and relieve distressed persons, and he cannot but grow less and less sensibly affected with the various miseries of life with which he must become acquainted; when yet, at

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* Book ii. chap. 6. (Page 56 of TAYLOR's Transl.)

"the same time, benevolence, considered not as a passion, but as a practical "principle of action, will strengthen: and whilst he passively compassionates the "distressed less, he will acquire a greater aptitude actively to assist and befriend "them. So also, at the same time that the daily instances of men's dying around "us, give us daily a less sensible passive feeling or apprehension of our own mortality, such instances greatly contribute to the strengthening a practical regard "to it in serious men, i. e. to forming a habit of acting with a constant view to it." —Butler's *Analogy*, page 122. 3d edit.

TRANSLATIONS

OF PASSAGES IN THE FIRST VOLUME.

Page 25, "est."

Hitherto, no man has existed, endowed with sufficient strength of mind to resolve and to impose upon himself the task, wholly to erase from his mind preconceived theories and common opinions, and to apply his intellect thus purified and unbiassed, anew, to the investigation of particular facts. Hence it arises, that the Reason which we possess, from our too great credulity and our permitting accidental causes to regulate our opinions, as well as from the puerile notions which we imbibe in our early years, is for the most part a heap and collection of indigested and ill-assorted prejudices. If some one at mature age, with faculties entire and an understanding purged from error, would apply himself anew to experience and to the investigation of particulars, from such an one we might hope for better things.

Page 33, "copularentur."—*Note.*

But the most deplorable error consists in a forgetfulness of the proper use of learning. Men seek knowledge from various motives. Some from constitutional restlessness and curiosity; some, as a pleasing occupation for the mind: others, from a desire of reputation; some, again, from the love of debate, and that they may excel in the arts of conversation; the greater part as a source of gain, and the means of livelihood: but few, very few, *for the purpose of exercising the faculty of Reason, the gift of Almighty God, for the benefit and improvement of mankind.* What would most contribute to ornament and elevate both learning and the arts, would be, a more strict alliance between contemplation and action.

Lord Bacon, On the advancement of Science, book i.

Page 35, "inventis."

We may conclude with certainty, that the real and just arts of invention gain strength and extent from every new discovery.

Page 37, "σχων,"—*Note.*

A thorough acquaintance with the Analytic power, is of more value than a multitude of demonstrations which are solitary and unconnected.

Ibid. "Antwerpiae, 1632."—*Note.*

Many are skilled in the operations of mathematics, but few in the science. It is one thing to know certain propositions, and to elicit from them others which are obvious, rather by accident than by any certain rule of inquiry; and another thoroughly to understand the nature and constitution of the science, to penetrate into its inmost recesses, and to be prepared with general precepts, by means of which the ability may be afforded, of striking out and demonstrating innumerable Theorems and Problems. For as ordinary painters by frequently copying the same exemplar, acquire some practice in colouring, but none of that skill in the art which is produced by the judgment of the eye; so many students, after reading Euclid and the books of some other geometers, in imitation of them are wont to draw and demonstrate some propositions, while they remain altogether ignorant of the recondite method of solving the more difficult theorems and Problems. J. de la Faille on the Centre of Gravity, Antwerp, 1632. Preface.

Page 63, "aversa."

It is not to be doubted, that in this art of memory, *attention* is the principal thing; as the keen observation of the eye upon a prospect which we view.

Page 64, "memoire."—*Note.*

It is attention more or less exact, which engraves more or less deeply objects in the memory.

Page 68, "requirantur."—*Note.*

The contractions of the muscles are performed and repeated with incredible velocity. We learn this from the running of quadrupeds; and also from the motions of the tongue, which pronounces four hundred words, perhaps two thousand letters, in a minute of time; and this, although to express many letters, several contractions of the muscles are necessary.

Page 87, "général."—*Note.*

An infant calls by the name of *Tree*, the first tree which we show him. A second tree which he sees recalls the same idea, and he gives it the same name. So of a third, and a fourth; and the word, *tree*, at first given to an individual, becomes to him the name of a class or genus; an abstract idea, which comprehends all trees in general.

Page 102, "necessitatem."—*Note.*

Beings are not to be multiplied without necessity.

Page 103, "occisi."

They disputed in loud tones until they became hoarse; then came unfair dealing, scoffs, threats, abuse; they strove to get the better of each other, and to overthrow their antagonists. When their rage can no longer be expressed in words, they come to blows, and to a real battle. Whatever happens in the palæstra is not wanting here; blows of the fist, slaps in the face, spitting, kicks, bites, and still more, what are not allowable in the palæstra, cudgels and swords. Many are wounded, some even slain.

Ibid. "loqui."

The Nominalists and Realists contended with fury. They became pale with rage, proceeded to abuse, spitting, and blows.

Ibid. "calamo."—*Note.*

Do you defend me with the sword, and I will defend you with the pen.

Page 107, "sunt."—*Note.*

The Nominalists, quitting in some degree the hypothesis of Abelard, maintained that universals consist in the notions and conceptions of the mind, formed by abstraction from individuals; whence they were called *Conceptualists.*

Ibid. "liquet."—*Note.*

There were three classes of Nominalists. Some, as Roscelinus, held that Universals are mere words. Others again placed them in the intellect only, and asserted that they are merely conceptions of the mind. These philosophers are by some styled Conceptualists, and distinguished from the Nominalists; though others confound them. A third class, placed Universals, not so much in single names or words, as in entire discourses; and this opinion John of Salisbury ascribes to Abelard; but what he understands by it I cannot perceive.

Page 112, "universelle."—*Note.*

Leibnitz had conceived the project of a philosophical and Universal language. Wilkins, bishop of Chester, and Dalgarno had laboured at this, but when he was in England, he told MM. Boyle and Oldenburgh, that be did not think these great men had yet hit the mark. They might indeed enable nations who did not understand each others' language to have an easy intercourse, but they had not reached the true real characters, which are the most perfect instruments which the human mind can employ, and would greatly facilitate reasoning, memory, and invention. These characters ought to resemble, as nearly as possible, those of Algebra, which in fact are very simple and very expressive, have neither superfluity nor ambiguity, and of which all the varieties are disposed in their proper classes. He spoke also of an Alphabet of human thoughts which he meditated. According to appearances, this Alphabet had relation to his universal language.

Page 113, "raison."—*Note.*

The remembrance of our sensations, and the faculty which we possess of reflecting upon and combining past sensations, constitute the sole principle of our knowledge. The supposition that there exist permanent laws, to which all observed phenomena are subjected, so as to re-appear at all times and in all circumstances such as determined by these laws, is the only foundation for the certainty of this knowledge.

We have the consciousness of having observed this permanence, and an involuntary sentiment compels us to believe that it will continue to subsist. The probability which exists of this, how great soever, is not certainty. No necessary relation connects with regard to us, the past with the future, nor the constancy of what I have seen to that which I might have continued to observe, were I placed in like circumstances; but the impression which leads me to regard as existing, as real, that which exhibits to me this character of constancy, is irresistible.

"When an Englishman and a Frenchman think alike," says Voltaire, "their "opinion cannot but be founded in truth."

Page 115, "plus."—*Note.*

One of my friends, a man of sense and veracity, related to me two facts of which he was an eye-witness. He had a very intelligent monkey, and amused himself with giving him nuts, of which he was very fond; but he placed them so far off, that, being retained by his chain, the monkey could not reach them. After many useless efforts, which served only to excite his ingenuity, the monkey seeing a domestic pass, carrying under his arm a napkin, seized upon this and made use of it to reach the nuts and draw them to him. The method of breaking the nuts called for a new invention. He effected this by placing the nuts on the ground, and causing to fall from some heighth a stone or pebble to break them. You see, sir, that without having learned with Galileo the laws of falling bodies, our monkey had remarked the force which bodies acquire in their fall. This means however ceased to answer the purpose. One day, it having rained, the earth became soft, the nuts sank in, and the stone had not force sufficient to break them. What does the monkey? He looks for a piece of tile, places the nuts upon it, and letting fall the stone, succeeds in cracking the nuts, which no longer sink in.

Page 132, "sunt."

Whatever things have grown up by use and custom, if they are not good, are yet adapted to each other.

Page 133, "*mundus!*"

By how small a portion of talent the world is ruled!

Page 135, "mali?"

What Reformer imitates time, which introduces innovations so gradually as to elude observation?

Time is the greatest of innovators. Why then should not we imitate time?

An obstinate retention of useless customs, is as turbulent a thing as innovation.

Since things of themselves perpetually change for the worse, if they be not corrected by a wise reformation, what end is there to the evil?

Page 145, "*confirmat.*"

Time destroys the fictions of opinion, but confirms the decisions of nature.

Page 151, "ponimus."—*Note.*

Wherever we go, we set our foot upon the theatre of some celebrated action.

Page 159, "sepulchris."

Then after length of time the labouring swains,
Who turn the turfs of those unhappy plains,
Shall rusty piles from the plowed furrows take,
And over empty helmets pass the rake;
Amazed at antique titles on the stones,
And mighty relics of gigantic bones.

Page 175, "tradiderunt."

How fortunate! if those who have written upon the mathematical sciences, had left us a description of the method and of the various essays by which they effected their inventions; and had not rather acted as Aristotle says mechanicks are wont to do in their art, who exhibit their machines when completed, but conceal the process of invention to excite the greater admiration. Invention in every art is often different from the account which is transmitted to posterity, and it is not to be supposed, that the propositions of Euclid or Archimedes were always discovered in the method and order which they have described to us.

Page 181, "terrâ."

———And stern Æneas in her dreams appears
Disdainful as by day: she seems alone
To wander in her sleep thro' ways unknown
Guideless and dark; or in a desert plain,
To seek her subjects and to seek in vain.

Page 198, "imminuerit."

That no one should be able to erase or tear it out, without at the same time, destroying the whole statue.

Page 213, "*φαντασιων.*"—*Note.*

Imaginations frequently admitted into the mind, become *opinions*; for the mind is tinged and dyed by its imaginations. Be it your care, that it be of the proper colour; and do you introduce such imaginations as may contribute to this end.

Page 219, "librum."—*Note.*

Whatever is dwelt upon and excites the attention, remains more firmly in the memory than what we pass rapidly over. If, therefore, you read over any composition twenty times, you fix it in the memory with less certainty, than by reading it only ten times, attempting after each reading to recite it, and when you are at last inspecting the book.

Page 220, "consuevimus."—*Note.*

Whatever we see trifling, common, or which happens frequently, we remember with difficulty, because the mind is roused only by what is new and remarkable. On the other hand, whenever we observe any thing worthy of great praise or blame, unusual, gigantic, wonderful, or ridiculous, we commonly remember it for a long time.

Page 222, "redites."—*Note.*

Especially old men are dangerous, in whom the remembrance of the past remains, but who have lost the memory of having often repeated their stories.

Page 227, "jugement."

I cannot retain the possession and disposition of my thoughts. Chance has them more at command than I. The occasion, the company, even the sound of my own voice, draws more from me than I can produce by any endeavours to recall and bring forward what I know. It often happens that I cannot find what I am looking for, or if I do, it is rather by good fortune than by inquiry.

Page 244, "experimento."—*Note.*

When we return to any place after a long absence, we recollect not only the place, but what we did there; the figures of our acquaintance, and sometimes even the secret operations of our thoughts, arise to our remembrance. The Art of Memory, as happens in many other cases, took its rise from such experience.

Page 248, "investigatio."—*Note.*

It is justly observed by Plato, that "whoever tries experiments, has some general "notion of what he seeks; otherwise, how can he know it when found? The more "full and clear therefore is our anticipation of what we seek, the more direct and "compendious will be our investigation."

Ibid. "informat."

A judicious plan of inquiry is the half of knowledge. Vague experiment, which follows whatever it may chance to meet with, is mere groping without light, and rather stupifies than instructs.

Page 253, "defaillance."—*Note.*

No man has less a right to speak of memory, for I cannot recognize in myself any traces of the faculty, and do not think there is a man in the world, who is so wonderfully deficient in this respect.

Page 255, "videamur."—*Note.*

A good memory gives the reputation of a ready invention, as what we say seems rather to be produced at the time, than to have been previously laid up.

Page 258, "aevo."

Come, see what pleasures in our plains abound,
The woods, the fountains, and the flowery ground.

Page 259, "*Phébus.*"

Bombast has a brilliancy which has or seems to have some meaning. The sun ordinarily makes a part of it, and in our language, this has perhaps given rise to the name.

Page 268, "*[illegible].*"

When you read any thing, which, from passion and enthusiasm you seem to set before you, and to exhibit to your hearers, we call it a *Phantasy* or vision.

Ibid. "videamur."—*Note.*

What the Greeks call *phantasies*, we call *visions*, by which the images of things absent are so represented to the mind, that they seem to be present, and immediately before our eyes.

Page 277, "*[illegible].*"—*Note.*

On this account, men of superiour genius, and who excel, whether in philosophy, politics, poetry, or art, appear *melancholy*.

ELEMENTS

OF

THE PHILOSOPHY

OF

The Human Mind.

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WITH TRANSLATIONS, &c. AND AN ADDITIONAL APPENDIX.

TWO VOLUMES BOUND IN ONE.

VOLUME SECOND.

BOSTON:
WELLS AND LILLY,—COURT-STREET.

September, 1821.

DISTRICT OF MASSACHUSETTS, TO WIT:

District Clerk's Office.

BE it remembered, that on the seventeenth day of September, A. D. 1821, in the forty-sixth year of the Independence of the United States of America, *Wells and Lilly* of the said District, have deposited in this Office the Title of a Book, the Right whereof they claim as Proprietors, in the Words following, *to wit* :—" Elements of the Philosophy of the Human Mind. By Dugald Stewart, Esq. F.R. SS. Lond. & Edin. Honorary Member of the Imperial Academy of Sciences at St. Petersburgh; Member of the Royal Academy of Berlin; and of the American Philosophical Society held at Philadelphia; formerly Professor of Moral Philosophy in the University of Edinburgh. With Translations, &c. and an additional Appendix. Two Volumes bound in one."

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ADVERTISEMENT.

After an interval of more than twenty years, I venture to present to the public a Second Volume on the Philosophy of the Human Mind.

When the preceding Part was sent to the press, I expected that a few short chapters would comprehend all that I had further to offer concerning the Intellectual Powers; and that I should be able to employ the greater part of this Volume in examining those principles of our constitution, which are immediately connected with the Theory of Morals. On proceeding, however, to attempt an analysis of Reason, in the more strict acceptation of that term, I found so many doubts crowding on me with respect to the logical doctrines then generally received, that I was forced to abandon the comparatively limited plan according to which I had originally intended to treat of the Understanding, and, in the mean time, to suspend the continuation of my work till a more unbroken leisure should allow me to resume it with a less divided attention.

Of the accidents which have since occurred to retard my progress, it is unnecessary to take any notice here. I allude to them, merely as an apology for those defects of method, which are the natural, and perhaps the unavoidable consequences of the frequent interruptions by which the train of my thoughts has been diverted to other pursuits. Such of my readers as are able to judge how very large a proportion of my materials has been the fruit of my own meditations; and who are aware of the fugitive nature of our reasonings concerning phenomena so far removed from the perceptions of Sense, will easily conceive the difficulty I must occasionally have experienced, in decyphering the short and slight hints on these topics, which I had committed to writing at remote periods of my life; and still more, in recovering the thread which had at first connected them together in the order of my researches.

I have repeatedly had occasion to regret the tendency of this intermitted and irregular mode of composition, to deprive my speculations of those advantages, in point of continuity, which, to the utmost of my power, I have endeavoured to give them, But I would willingly indulge the hope, that this is a blemish more likely to meet the eye of the author than of the reader; and I am confident, that the critic who shall honour me with a sufficient degree of attention, to detect it where it may occur, will not be inclined to treat it with an undue severity.

A Third Volume (of which the chief materials are already prepared) will comprehend all that I mean to publish under the title of the Philosophy of the Human Mind. The principal subjects allotted for it are Language; Imitation; the Varieties of intellectual Character; and the Faculties by which Man is distinguished from the lower animals. The two first of these articles belong, in strict propriety, to this second part of my work; but the size of the volume has prevented me from entering on the consideration of them at present.

The circumstances which have so long delayed the publication of these volumes on the Intellectual Powers, have not operated, in an equal degree, to prevent the prosecution of my inquiries into those principles of Human Nature, to which my attention was, for many years, statedly and forcibly called by my official duty. Much, indeed, still remains to be done in maturing, digesting, and arranging many of the doctrines which I was accustomed to introduce into my lectures; but if I shall be blessed, for a few years longer, with a moderate share of health and of mental vigour, I do not altogether despair of yet contributing something, *in the form of Essays*, to fill up the outline which the sanguine imagination of youth encouraged me to conceive, before I had duly measured the magnitude of my undertaking with the time or with the abilities which I could devote to the execution.

The volume which I now publish is more particularly intended for the use of Academical Students; and is offered to them as a guide or assistant, at that important stage of their progress when, the usual course of discipline being completed, an inquisitive mind is naturally led to review its past attainments, and to form plans for its future improvement. In the prosecution of this design, I have not aimed at the establishment of new theories; far less have I aspired to the invention of any new *organ* for the discovery of truth. My principal object is to aid my readers in unlearning the scholastic errours, which, in a greater or less degree, still maintain their ground in our most celebrated seats of learning; and by subjecting to *free*, but, I trust, not *sceptical* discussion, the more enlightened though discordant systems of modern Logicians, to accustom the understanding to the unfettered exercise of its native capacities. That several of the views opened in the following pages appear to myself original, and of some importance, I will not deny; but the reception these may meet with, I shall regard as a matter of comparative indifference, if my labours be found useful in training the mind to those habits of reflection on its own operations, which may enable it to superadd to the instructions of the schools, that higher education which no schools can bestow.

KINNEIL-HOUSE,
22 November, 1813.

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ELEMENTS

OF THE

PHILOSOPHY OF THE HUMAN MIND.

PART SECOND.

OF REASON, OR THE UNDERSTANDING PROPERLY SO CALLED; AND THE VARIOUS FACULTIES AND OPERATIONS MORE IMMEDIATELY CONNECTED WITH IT.

Preliminary observations on the vagueness and ambiguity of the common philosophical language relative to this part of our constitution.—Reason and reasoning,—understanding,—intellect,—judgment, &c.

The power of Reason, of which I am now to treat, is unquestionably the most important by far, of those, which are comprehended under the general title of Intellectual. It is on the right use of this power, that our success in the pursuit both of knowledge and of happiness depends; and it is by the exclusive possession of it that Man is distinguished, in the most essential respects, from the lower animals. It is, indeed, from their subserviency to its operations, that the other faculties, which have been hitherto under our consideration, derive their chief value.

In proportion to the peculiar importance of this subject are its extent and its difficulty;—both of them such as to lay me under a necessity, now that I am to enter on the discussion, to contract, in various instances, those designs in which I was accustomed to indulge myself, when I looked forward to it from a distance. The execution of them at present, even if I were more competent to the task, appears to me, on a closer examination, to be altogether incompatible with the comprehensiveness of the general plan which was sketched out in the advertisement prefixed to the former volume; and to the accomplishment of which I am anxious, in the first instance, to direct my efforts. If that undertaking should ever be completed, I may perhaps be able afterwards to offer additional illustrations of certain articles, which the limits of this part of my work prevent me from considering with the attention which they deserve. I should wish, in particular, to contribute something more than I can here introduce, towards a rational and practical system of Logic, adapted to the present state of human knowledge, and to the real business of human life.

"What subject (says Burke) does not branch out to infinity! It is "the nature of our particular scheme, and the single point of view "in which we consider it, which ought to put a stop to our re"searches."* How forcibly does the remark apply to all those speculations which relate to the principles of the Human Mind!

I have frequently had occasion, in the course of the foregoing disquisitions, to regret the obscurity in which this department of philosophy is involved, by the vagueness and ambiguity of words; and I have mentioned, at the same time, my unwillingness to attempt verbal innovations, wherever I could possibly avoid them, without essential injury to my argument. The rule which I have adopted in my own practice is, to give to every faculty and operation of the mind its own appropriate name; following, in the selection of this name, the *prevalent* use of our best writers; and endeavouring afterwards, as far as I have been able, to employ each word *exclusively*, in that acceptation in which it has hitherto been used *most generally*. In the judgments which I have formed on points of this sort, it is more than probable that I may sometimes have been mistaken; but the mistake is of little consequence, if I myself have invariably annexed the same meaning to the same phrase;—an accuracy which I am not so presumptuous as to imagine that I have uniformly attained, but which I am conscious of having, at least, uniformly attempted. How far I have succeeded, they alone who have followed my reasonings with a very critical attention are qualified to determine; for it is not by the statement of formal definitions, but by the habitual use of precise and appropriate language, that I have endeavoured to fix in my reader's mind the exact import of my expressions.

In appropriating, however, particular words to particular ideas, I do not mean to censure the practice of those who may have understood them in a sense different from that which I annex to them; but I found that, without such an appropriation, I could not explain my notions respecting the human mind, with any tolerable degree of distinctness. This scrupulous appropriation of terms, if it can be called an *innovation*, is the only one which I have attempted to introduce; for in no instance have I presumed to annex a philosophical meaning to a technical word belonging to this branch of science, without having previously shewn, that it has been used in the same sense by good writers, in some passages of their works. After doing this, I hope I shall not be accused of affectation, when I decline to use it in any of the other acceptations, in which, from carelessness or from want of precision, they may have been led occasionally to employ it.

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* Conclusion of the Inquiry into the Sublime and the Beautiful.

Some remarkable instances of vagueness and ambiguity in the employment of words, occur in that branch of my subject of which I am now to treat. The word *reason* itself is far from being precise in its meaning. In common and popular discourse, it denotes that power by which we distinguish truth from falsehood, and right from wrong; and by which we are enabled to combine means for the attainment of particular ends. Whether these different capacities are, with strict logical propriety, referred to the same power, is a question which I shall examine in another part of my work; but that they are all included in the idea which is generally annexed to the word *reason*, there can be no doubt; and the case, so far as I know, is the same with the corresponding term in all languages whatever. The fact probably is, that this word was first employed to comprehend the principles, whatever they are, by which man is distinguished from the brutes; and afterwards came to be somewhat limited in its meaning, by the more obvious conclusions concerning the nature of that distinction, which present themselves to the common sense of mankind. It is in this enlarged meaning that it is opposed to *instinct* by Pope:

> " And Reason raise o'er Instinct as you can;
> " In this 'tis God directs, in that 'tis Man."

It was thus, too, that Milton plainly understood the term, when he remarked, that smiles imply the exercise of reason;

> " ——Smiles from Reason flow,
> " To brutes denied:"——

And still more explicitly in these noble lines:

> " There wanted yet the master-work, the end
> " Of all yet done; a creature who, not prone
> " And brute as other creatures, but endued
> " With sanctity of *reason*, might erect
> " His stature, and upright with front serene
> " Govern the rest, self-knowing; and from thence,
> " Magnanimous, to correspond with heaven;
> " But, grateful to acknowledge whence his good
> " Descends, thither with heart, and voice, and eyes
> " Directed in devotion, to adore
> " And worship God Supreme, who made him chief
> " Of all his works."

Among the various characteristics of humanity, the power of devising means to accomplish ends, together with the power of distinguishing truth from falsehood, and right from wrong, are obviously the most conspicuous and important; and accordingly it is to these that the word *reason*, even in its most comprehensive acceptation, is now exclusively restricted.*

* This, I think, is the meaning which most naturally presents itself to common readers, when the word *reason* occurs in authors not affecting to aim at any nice logical distinc-

By some philosophers, the meaning of the word has been, of late, restricted still farther; to the power by which we distinguish truth from falsehood, and combine means for the accomplishment of our purposes;—the capacity of distinguishing right from wrong, being referred to a separate principle or faculty, to which different names have been assigned in different ethical theories. The following passage from Mr. Hume contains one of the most explicit statements of this limitation which I can recollect: "Thus the distinct boundaries and offices of reason and of taste are easily ascertained. The former conveys the knowledge of truth and falsehood; the latter gives the sentiment of beauty and deformity,—vice and virtue. Reason, being cool and disengaged, is no motive to action, and directs only the impulse received from appetite or inclination, by shewing us the means of attaining happiness or avoiding misery. Taste, as it gives pleasure or pain, and thereby constitutes happiness or misery, becomes a motive to action, and is the first spring or impulse to desire and volition."*

On the justness of this statement of Mr. Hume, I have no remarks to offer here; as my sole object in quoting it was to illustrate the different meanings annexed to the word *reason* by different writers. It will appear afterwards, that, in consequence of this circumstance, some controversies, which have been keenly agitated about the principles of morals, resolve entirely into verbal disputes; or at

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tions; and it is certainly the meaning which must be annexed to it, in some of the most serious and important arguments in which it has ever been employed. In the following passage, for example, where Mr. Locke contrasts the light of Reason with that of Revelation, he plainly proceeds on the supposition, that it is competent to appeal to the former, as affording a standard of right and wrong, not less than of speculative truth and falsehood; nor can there be a doubt that, when he speaks of *truth* as the object of natural reason, it was principally, if not wholly, *moral* truth, which he had in his view: "Reason is natural revelation, whereby the eternal Father of light, and Fountain of all knowledge, communicates to mankind that portion of truth which he has laid within the reach of their natural faculties. Revelation is natural reason, enlarged by a new set of discoveries, communicated by God immediately, which reason vouches the truth of, by the testimony and proofs it gives that they come from God. So that he who takes away reason to make way for revelation, puts out the light of both, and does much the same, as if he would persuade a man to put out his eyes, the better to receive the remote light of an invisible star by a telescope."—*Locke's Essay*, B. iv. c. 19.

A passage still more explicit for my present purpose occurs in the pleasing and philosophical conjectures of Huyghens, concerning the planetary worlds. "Positis vero ejusmodi planetarum incolis ratione utentibus, quaeri adhuc potest, anne idem illic, atque apud nos, sit hoc quod *rationem* vocamus. Quod quidem ita esse omnino dicendum videtur, neque aliter fieri posse, sive usum rationis in his consideremus quae ad mores et aequitatem pertinent, sive in iis quae spectant ad principia et fundamenta scientiarum. Etenim ratio apud nos est, quae sensum justitiae, honesti, laudis, clementiae, gratitudinis ingenerat, mala ac bona in universum discernere docet: quaeque ad haec animum disciplinae, multorumque inventorum capacem reddit, &c. &c.—*Hugenii Opera Varia*, Vol. II. p. 663. Lugd. Batav. 1724. [That the planets are inhabited by beings endued with reason, being presupposed, it may be inquired, whether what we call, *Reason*, is the same with them and with us? That this is the case is clear, and it cannot be otherwise, whether we consider the use of reason in those things which pertain to morals and equity, or in those which have respect to the principles and foundation of the sciences. For reason with us is that which inspires the sense of justice, honour, praise, humanity, gratitude, teaches in all things to distinguish the good and evil, and renders the mind capable of instruction, and of various discoveries or inventions.]

* Essays and Treatises, &c. Appendix concerning Moral Sentiment.

most, into questions of arrangement and classification, of little comparative moment to the points at issue.*

Another ambiguity in the word *reason*, it is of still greater consequence to point out at present; an ambiguity which leads us to confound our rational powers in general, with that particular branch of them, known among logicians by the name of the *discursive faculty*. The affinity between the words *reason* and *reasoning* sufficiently accounts for this inaccuracy in common and popular language; although it cannot fail to appear obvious, on the slightest reflection, that, in strict propriety, *reasoning* only expresses *one* of the various functions or operations of *reason*; and that an extraordinary capacity for the former by no means affords a test by which the other constituent elements of the latter may be measured.† Nor is it to common and popular language that this inaccuracy is confined. It has extended itself to the systems of some of our most acute philosophers, and has, in various instances, produced an apparent diversity of opinion where there was little or none in reality.

"No hypothesis (says Dr. Campbell) hitherto invented, hath "shewn that, by means of the discursive faculty, without the aid of "any other mental power, we could ever obtain a notion of either "the beautiful or the good"‡ The remark is undoubtedly true, and may be applied to all those systems which ascribe to reason the origin of our moral ideas, if the expressions *reason* and *discursive faculty* be used as synonymous. But it was assuredly not in this restricted acceptation, that the word *reason* was understood by those ethical writers at whose doctrines this criticism seems to have been pointed by the ingenious author. That the discursive faculty alone is sufficient to account for the origin of our moral ideas, I do not know that any theorist, ancient or modern, has yet ventured to assert.

Various other philosophical disputes might be mentioned, which *would be* at once brought to a conclusion, if this distinction between reason and the power of reasoning were steadily kept in view.§

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* In confirmation of this remark, I shall only quote at present a few sentences from an excellent discourse, by Dr Adams of Oxford, on the nature and obligations of Virtue. "Nothing can bring us under an obligation to do what appears to our moral judgment wrong. It may be supposed our interest to do this; but it cannot be supposed our duty. ———Power may compel, interest may bribe, pleasure may persuade; but *reason* only can oblige. This is the only authority which rational beings can own, and to which they owe obedience."

It must appear perfectly obvious to every reader. that the apparent difference of opinion between this writer and Mr. Hume, turns chiefly on the different degrees of latitude with which they have used the word *reason*. Of the two, there cannot be a doubt that Dr. Adams has adhered by far the most faithfully, not only to its acceptation in the works of our best English authors, but to the acceptation of the corresponding term in the ancient languages. "Est quidem vera lex, recta ratio——— quae vocet ad officium, jubendo; vetando, a fraude deterreat." [It is the real law, right reason—which calls to duty by command, and by prohibition deters from injustice, &c &c.]

† "The two most different things in the world (says Locke) are, a logical chicaner and a man of reason."—*Conduct of the Understanding*, § 3.

‡ Philosophy of Rhetoric, vol. I. p. 204. [Boston edition, p. 109]

§ It is curious, that Dr. Johnson has assigned to this very limited. and (according to present usage) very doubtful interpretation of the word *reason*, the *first* place in his enu-

In the use which I make of the word *reason*, in the title of the following disquisitions, I employ it in a manner to which no philosopher can object—to denote merely the power by which we distinguish truth from falsehood, and combine means for the attainment of our ends: omitting for the present all consideration of that function which many have ascribed to it, of distinguishing right from wrong; without, however, presuming to call in question the accuracy of those by whom the term has been thus explained. Under the title of *Reason*, I shall consider also whatever faculties and operations appear to be more immediately and essentially connected with the discovery of *truth*, or the attainment of the objects of our pursuit,—more particularly the Power of Reasoning or Deduction; but distinguishing, as carefully as I can, our capacity of carrying on this logical process, from those more comprehensive powers which Reason is understood to imply.

The latitude with which this word has been so universally used, seemed to recommend it as a convenient one for a *general title*, of which the object is rather comprehension than precision. In the discussion of particular questions, I shall avoid the employment of it as far as I am able; and shall endeavour to select other modes of speaking, more exclusively significant of the ideas which I wish to convey.*

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meration of its various meanings, as if he had thought it the sense in which it is most properly and correctly employed. "Reason (he tells us) is the power by which man deduces one proposition from another, or proceeds from premises to consequences." The authority which he has quoted for this definition is still more curious, being manifestly altogether inapplicable to his purpose. "Reason is the director of man's will, discovering in action what is good; for the laws of well-doing are the dictates of right reason."—*Hooker.*

In the *sixth* article of the same enumeration, he states as a distinct meaning of the same word, *ratiocination. discursive power.* What possible difference could he conceive between this signification and that above quoted? The authority, however, which he produces for this last explanation is worth transcribing. It is a passage from Sir John Davis, where that fanciful writer states a distinction between reason and understanding; to which he seems to have been led by a conceit founded on their respective etymologies.

"When she rates things, and moves from ground to ground,
"The name of Reason she obtains by this;
"But when by Reason she the truth hath found,
"And standeth fixt, she Uunderstanding is."

The adjective *reasonable*, as employed in our language, is not liable to the same ambiguity with the substantive from which it is derived. It denotes a character in which *reason* (taking that word in its largest acceptation) possesses a decided ascendant over the temper and the passions; and implies no particular propensity to a display of the discursive power, if indeed it does not exclude the idea of such a propensity. In the following stanza, Pope certainly had no view to the logical talents of the lady whom he celebrates:

"I know a thing that's most uncommon,
"(Envy, be silent and attend)
"I know a *reasonable* woman,
"Handsome and witty yet a friend."

Of this *reasonable woman*, we may venture to conjecture, with some confidence, that she did not belong to the class of those *femmes raisonneuses*, so happily described by Moliere:

"Raisonner est l'emploi de toute ma maison
"Et le raisonnement en bannit la raison."

* Mr. Locke too has prefixed the same title, Of *Reason*, to the 17th chapter of his

Another instance of the vagueness and indistinctness of the com-
on language of logicians, in treating of this part of the Philosophy
the Human Mind, occurs in the word *Understanding*. In its popu-
r sense, it seems to be very nearly synonymous with *reason*, when
at word is used most comprehensively; and is seldom or never
plied to any of our faculties, but such as are immediately subser-
ent to the investigation of truth, or to the regulation of our con-
ct. In this sense, it is so far from being understood to compre-
nd the powers of Imagination, Fancy, and Wit, that it is often stat-
l in direct opposition to them; as in the common maxim, that a
und understanding and a warm imagination are seldom united in
e same person. But philosophers, without rejecting this use of
e word, very generally employ it, with far greater latitude, to
mprehend all the powers which I have enumerated under the ti-
e of intellectual; referring to it Imagination, Memory, and Percep-
n, as well as the faculties to which it is appropriated in popular
scourse, and which it seems indeed most properly to denote. It is
this manner that it is used by Mr. Locke in his celebrated Essay;
d by all the logicians who follow the common division of our
ental powers into those of the Understanding and those of the
ill.

In mentioning this ambiguity, I do not mean to cavil at the phra-
ology of the writers from whom it has derived its origin, but only
point it out as a circumstance which may deserve attention in some
our future disquisitions. The division of our powers which has
d to so extraordinary an extension of the usual meaning of lan-
age, has an obvious foundation in the constitution of our nature,
d furnishes an arrangement which seems indispensable for an ac-
urate examination of the subject: nor was it unnatural to bestow
those faculties, which are all subservient in one way or another

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rth Book, using the word in a sense nearly coinciding with that very extensive one
ich I wish my readers to annex to it here.

After observing, that by reason he means "that faculty whereby man is supposed to be
tinguished from brutes and wherein it is evident he much surpasses them;" he adds,
at "we may in reason consider these four degrees:—the first and highest is the discover-
g and finding out of proofs; the second, the regular and methodical disposition of them,
d laying them in a clear and fit order, to make their connexion and force be plainly and
ily perceived; the third is the perceiving their connexion; and the fourth is making a
ht conclusion."

Dr. Reid's authority for this use of the word is equally explicit: "The power of rea-
ning is very nearly allied to that of judging. We include both under the name of *rea-
n*."—*Intellect. Powers*, p. 671 4to edit.

Another authority to the same purpose is furnished by Milton:

————————"Whence the soul
"Reason receives; and Reason is HER BEING—
"—*Discursive* or intuitive." *Par. Lost*, B. v. l. 486.

(I presume that Milton, who was a logician as well as a poet, means by the words *her
ing*, her *essential* or characteristical endowment.)

To these quotations I shall only add a sentence from a very judicious French writer;
hich I am tempted to introduce here, less on account of the sanction which it gives to my
n phraseology, than of the importance of the truth which it conveys.

"Reason is commonly employed as an instrument to acquire the sciences; whereas, on
the contrary, the sciences ought to be made use of as an instrument to give reason its per-
fection." *L'Art de Penser*, translated by Ozel. p. 2. London, 1717.

to the right exercise of the Understanding, the name of that power, from their relation to which their chief value arises.

As the word *understanding*, however, is one of those which occur very frequently in philosophical arguments, it may be of some use to disengage it from the ambiguity just remarked; and it is on this account that I have followed the example of some late writers, in distinguishing the two classes of powers which were formerly referred to the Understanding and to the Will, by calling the former *intellectual*, and the latter *active*. The terms *cognitive* and *motive* were long ago proposed for the same purpose by Hobbes; but they never appear to have come into general use, and are indeed liable to obvious objections.

It has probably been owing to the very comprehensive meaning annexed in philosophical treatises to the word *understanding*, that the use of it has so frequently been supplied of late by *intellect*. The two words, as they are commonly employed, seem to be very nearly, if not exactly, synonymous; and the latter possesses the advantage of being quite unequivocal, having never acquired that latitude of application of which the former admits. The adjective *intellectual*, indeed, has had its meaning extended as far as the substantive *understanding*; but, as it can be easily dispensed with in our particular arguments, it may, without inconvenience, be adopted as a distinctive epithet, where nothing is aimed at but to mark, in simple and concise language, a very general and obvious classification. The word *intellect* can be of no essential use whatever, if the ambiguity in the signification of the good old English word *understanding* be avoided; and as to *intellection*, which a late very acute writer[*] has attempted to introduce, I can see no advantage attending it, which at all compensates for the addition of a new and uncouth term to a phraseology which, even in its most simple and unaffected form, is so apt to revolt the generality of readers.

The only other indefinite word which I shall take notice of in these introductory remarks is *judgment*; and, in doing so, I shall confine myself to such of its ambiguities as are more peculiarly connected with our present subject.

In some cases, its meaning seems to approach to that of *understanding*; as in the nearly synonymous phrases, *a sound understanding*, and *a sound judgment*. If there be any difference between these two modes of expression, it appears to me to consist chiefly in this, that the former implies a greater degree of positive ability than the latter; which indicates rather an exemption from those biasses which lead the mind astray, than the possession of any uncommon reach of capacity. To *understanding* we apply the epithets strong, vigorous, comprehensive, profound: To *judgment*, those of correct. cool, unprejudiced, impartial, solid It was in this sense that the word seems to have been understood by Pope, in the following couplet:

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[*] Dr. Campbell. See his Philosophy of Rhetoric, Vol. I. p. 103, 1st edit. [Boston edition, p. 57.

"'Tis with our judgments as our watches; none
"Go just alike, yet each believes his own."

For this meaning of the word, its primitive and literal application to the judicial decision of a tribunal accounts sufficiently.

Agreeably to the same fundamental idea, the name of *judgment* is given, with peculiar propriety, to those acquired powers of discernment which characterize a skilful critic in the fine arts; powers which depend in a very great degree, on a temper of mind free from the undue influence of authority and of casual associations. The power of Taste itself is frequently denoted by the appellation of *judgment*; and a person who possesses a more than ordinary share of it, is said to be *a judge* in those matters which fall under its cognizance.

The meaning annexed to the word by logical writers is considerably different from this; denoting one of the simplest acts or operations of which we are conscious, in the exercise of our rational powers. In this acceptation, it does not admit of definition, any more than *sensation*, *will*, or *belief*. All that can be done, in such cases, is to describe the occasions on which the operation takes place, so as to direct the attention of others to their own thoughts. With this view, it may be observed, in the present instance, that when we give our assent to a mathematical axiom; or when, after perusing the demonstration of a theorem, we assent to the conclusion; or, in general, when we pronounce concerning the truth or falsity of any proposition, or the probability or improbability of any event, the power by which we are enabled to perceive what is true or false, probable or improbable, is called by logicians the faculty of *judgment*. The same word, too, is frequently used to express the particular acts of this power, as when the decision of the understanding on any question is called a judgment of the mind.

In treatises of logic, *judgment* is commonly defined to be an act of the mind, by which one thing is affirmed or denied of another; a definition which, though not unexceptionable, is, perhaps less so than most that have been given on similar occasions. Its defect (as Dr. Reid has remarked) consists in this,—that although it be by affirmation or denial that we express our judgments to others, yet judgment is a solitary act of the mind, to which this affirmation or denial is not essential; and therefore, if the definition be admitted, it must be understood of mental affirmation or denial only; in which case, we do no more than substitute, instead of the thing defined, another mode of speaking perfectly synonymous. The definition has, however, notwithstanding this imperfection, the merit of a conciseness and perspicuity, not often to be found in the attempts of logicians to explain our intellectual operations.

Mr. Locke seems disposed to restrict the word *judgment* to that faculty which pronounces concerning the veri-similitude of doubtful propositions; employing the word *knowledge* to express the faculty which perceives the truth of propositions, either intuitively or demonstratively certain. "The faculty which God has given man, to "supply the want of clear and certain *knowledge* in cases where "that cannot be had, is *judgment;* whereby the mind takes its ideas "to agree or disagree; or, which is the same thing, any proposition "to be true or false, without perceiving a demonstrative evidence in "the proofs.

"Thus, the mind has two faculties, conversant about truth and "falsehood.

"First, *knowledge*, whereby it certainly perceives, and is undoubtedly satisfied of the agreement or disagreement of any ideas.

"Secondly, *judgment*, which is the putting ideas together, or "separating them from one another in the mind, when their agreement or disagreement is not perceived, but presumed to be so; "which is, as the word imports, taken to be so, before it certainly "appears. And if it so unites, or separates them, as in reality "things are, it is *right judgment.*"*

For this limitation in the definition of *judgment*, some pretence is afforded by the literal signification of the word, when applied to the decision of a tribunal; and also, by its metaphorical application to the decisions of the mind, on those critical questions which fall under the province of Taste. But, considered as a technical or scientific term of logic, the practice of our purest and most correct writers sufficiently sanctions the more enlarged sense in which I have explained it; and, if I do not much deceive myself, this use of it will be found more favourable to philosophical distinctness than Mr. Locke's language, which leads to an unnecessary multiplication of our intellectual powers. What good reason can be given for assigning one name to the faculty which perceives truths that are *certain*, and another name to the faculty which perceives truths that are *probable?* Would it not be equally proper to distinguish, by different names, the power by which we perceive one proposition to be *true*, and another to be *false?*

As to *knowledge*, I do not think that it can, with propriety, be contrasted with *judgment;* nor do I apprehend that it is at all agreeable, either to common use or to philosophical accuracy, to speak of knowledge as a *faculty*. To me it seems rather to denote the *possession* of those truths, about which our faculties have been previously employed, than any separate power of the understanding, by which truth is perceived.†

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* Essay on the Human Understanding, Book iv. Chap. 14.

† In attempting thus to fix the logical import of various words in our language which are apt to be confounded, in popular speech, with *reason*, and also with *reasoning*, some of my readers may be surprised, that I have said nothing about the word *wisdom*. The truth is, that the notion expressed by this term, as it is employed by our best writers, seems to presuppose the influence of some principles, the consideration of which belongs to a different part of my work. In confirmation of this, it may be remarked, that whereas the province of our reasoning powers (in their application to the business of life,) is limited to the choice of *means*, *wisdom* denotes a power of a more comprehensive nature, and of a higher order; a power which implies a judicious selection both of *means* and of *ends*.

It is very precisely defined by Sir William Temple, to be "that which makes men judge what are the best ends, and what the best means to attain them."

Of these two modifications of wisdom, the one denotes a power of the mind which obviously falls under the view of the logician; the examination of the other as obviously belongs to ethics.

e concluding these preliminary remarks, I cannot help ex-
my regret, that the subject on which I am about to enter
requently lay me under the necessity of criticising the lan-
nd of disputing the opinions of my predecessors. In doing so,
t conscious of being at all influenced by a wish to indulge
n the captiousness of controversy; nor am I much afraid of
utation from any of my readers who shall honour these
ions with an attentive perusal. My real aim is, in the *first*
explain the grounds of my own deviations from the track
as been commonly pursued; and, *secondly*, to facilitate the
s of such as may follow me in the same path, by directing
tention to those points of divergency in the way, which may
matter for doubt or hesitation. I know, at the same time,
the opinion of many, the best mode of unfolding the prin-
f a science is to state them systematically and concisely,
any historical retrospects whatever; and I believe the opi-
well-founded, in those departments of knowledge, where the
arises less from vague ideas and indefinite terms, than from
th of the logical chain which the student has to trace. But,
disquisitions as we are now engaged in, it is chiefly from the
correction of verbal ambiguities, and the gradual detection
pected prejudices, that a progressive, though slow approxi-
o truth, is to be expected. It is indeed a slow approxima-
best, that we can hope to accomplish at present, in the ex-
n of a subject where so many powerful causes (particularly
nnected with the imperfections of language) conspire to lead
y. But the study of the human mind is not, on that account,
andoned. Whoever compares its actual state with that in
Bacon, Des Cartes, and Locke found it, must be sensible how
heir efforts for its improvement have been repaid, both by
m attainments, and by those of others who have since pro-
their example. I am willing to hope, that some useful
its farther advancement may be derived even from my own

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ction similar to this was plainly in the mind of Cudworth when he wrote the fol-
sage, which, although drawn from the purest sources of ancient philosophy, will,
t, from the uncouthness of the phraseology, have the appearance of extrava-
ncy in the present times. To myself it appears to point at *a fact* of the high-
ance in the moral constitution of man.
ve all of us by nature *μαντωμα τι* (as both Plato and Aristotle call it) a cer-
ation, *presage*, and *paturient vaticination* in our minds, of some higher good and
, than either *power* or *knowledge* Knowledge is plainly to be preferred before
being that which guides and directs its blind force and impetus; but Aristotle
clares, that there is *λογου τι κρειττον*, which is *λογου αρχη*; *something better than
l knowledge, which is the principle and original of it* For (saith he) *λογου αρχη
αλλα τι κρειττον*. *The principle of reason is not reason, but something better.*"—
l *System*. *p.* 203.
aftesbury has expressed the same truth more simply and perspicuously in that
entence which occurs more than once in his writings: "True wisdom comes
the heart than from the head."—Numberless illustrations of this profound max-
mediately crowd on the memory of all who are conversant with the most
d works on the theory of legislation; more particularly, with those which ap-
ring the eighteenth century, on the science of political economy.

researches; and, distant as the prospect may be of raising it to a level with the physical science of the Newtonian school, by uniting the opinions of speculative men about fundamental principles, my ambition as an author will be fully gratified, if, by the few who are competent to judge, I shall be allowed to have contributed my share, however small, towards the attainment of so great an object.

In the discussions which immediately follow, no argument will, I trust, occur beyond the reach of those who shall read them with the attention which every inquiry into the human mind indispensably requires. I have certainly endeavoured, to the utmost of my abilities, to render every sentence which I have written, not only intelligible but perspicuous; and, where I have failed in the attempt, the obscurity will, I hope, be imputed, not to an affectation of mystery, but to some errour of judgment. I can, without much vanity, say, that, with less expense of thought, I could have rivalled the obscurity of Kant; and that the invention of a new technical language, such as that which he has introduced, would have been an easier task, than the communication of clear and precise notions (if I have been so fortunate as to succeed in this communication,) without departing from the established modes of expression.

To the following observations of D'Alembert (with some trifling verbal exceptions) I give my most cordial assent; and, mortifying as they may appear to the pretensions of bolder theorists, I should be happy to see them generally recognised as canons of philosophical criticism: "Truth in metaphysics resembles truth in matters of " taste. In both cases, the seeds of it exist in every mind; though " few think of attending to this latent treasure, till it be pointed out " to them by more curious inquirers. It should seem that every " thing we learn from a good metaphysical book is only a sort of re" miniscence of what the mind previously knew. The obscurity, of " which we are apt to complain in this science, may be always justly " ascribed to the author; because the information, which he profess" es to communicate, requires no technical language appropriated to " itself. Accordingly, we may apply to good metaphysical authors " what has been said of those who excel in the art of writing, that, " in reading them, every body is apt to imagine, that he himself " could have written in the same manner.

" But, in this sort of speculation, if all are qualified to understand, " all are not fitted to teach. The merit of accommodating easily to " the apprehension of others, notions, which are at once simple and " just, appears, from its extreme rarity, to be much greater than is " commonly imagined. Sound metaphysical principles are truths " which every one is ready to seize, but which few men have the talent " of unfolding; so difficult is it in this, as well as in other instances, to " appropriate to one's self what seems to be the common inheritance " of the human race."*

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* " Le vrai en métaphysique ressemble au vrai en matière de goût; c'est un vrai dont tous les esprits ont le germe en eux-mêmes, auquel la plupart ne font point d'attention, mais qu'ils reconnoissent dès qu'on le leur montre. Il semble que tout ce qu'on apprend

I am, at the same time, fully aware, that whoever, in treating of the human mind, aims to be understood, must lay his account with forfeiting, in the opinion of a very large proportion of readers, all pretensions to depth, to subtlety, or to invention. The acquisition of a new nomenclature is, in itself, no inconsiderable reward to the industry of those, who study only from motives of literary vanity; and, if D'Alembert's idea of this branch of science be just, the wider an author deviates from truth, the more likely are his conclusions to assume the appearance of discoveries. I may add, that it is chiefly in those discussions which possess the best claims to originality, where he may expect to be told by the multitude, that they have learned from him nothing but what they knew before.

The latitude with which the word *metaphysics* is frequently used, makes it necessary for me to remark, with respect to the foregoing passage from D'Alembert, that he limits the term entirely to an account of the origin of our ideas. "The generation of our ideas (he "tells us) belongs to metaphysics. It forms one of the *principal* "objects, and perhaps ought to form the *sole* object of that sci"ence."*—If the meaning of the word be extended, as it too often is in our language, so as to comprehend all those inquiries which relate to the theory and to the improvement of our mental powers, some of his observations must be understood with very important restrictions. What he has stated, however, on the inseparable connexion between perspicuity of style and soundness of investigation in metaphysical disquisitions, will be found to hold equally in every research to which that epithet can, with any colour of propriety, be applied.

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dans un bon livre de métaphysique, ne soit qu'une espèce de réminiscence de ce que notre ame a déjà su; l'obscurité, quand il y en a, vient toujours de la faute de l'auteur, parce que la science qu'il se propose d'enseigner n'a point d'autre langue que la langue commune. Aussi peut-on appliquer aux bons auteurs de mètaphysique ce qu'on a dit des bons écrivains, qu'il n'y a personne qui en les lisant, ne croie pouvoir en dire autant qu'eux.

"Mais si dans ce genre tous sont faits pour entendre, tous ne sont pas faits pour instruire. Le mérite de faire entrer avec facilité dans les esprits des notions vraies et simples, est beaucoup plus grand qu'on ne pense, puisque l'expérience nous prouve combien il est rare; les saines idées métaphysiques sont des vérités communes que chacun saisit, mais que peu d'hommes ont le talent de développer; tant il est difficile, dans quelque sujet que ce puisse être, de se rendre propre ce qui appartient à tout le monde."—*Elemens de Philosophie.*

[*] "La génération de nos idées appartient à la métaphysique; c'est un de ses objets principaux, et peut-être devroit elle s'y borner."—*Elemens de Philosophie.*

CHAPTER FIRST.

OF THE FUNDAMENTAL LAWS OF HUMAN BELIEF; OR THE PRIMARY ELEMENTS OF HUMAN REASON.

The propriety of the title prefixed to this Chapter will, I trust, be justified sufficiently by the speculations which are to follow. As these differ, in some essential points, from the conclusions of former writers, I found myself under the necessity of abandoning, in various instances, their phraseology;—but my reasons for the particular changes which I have made, cannot possibly be judged of, or even understood, till the inquiries by which I was led to adopt them be carefully examined.

I begin with a review of some of those primary truths, a conviction of which is necessarily implied in all our thoughts and in all our actions; and which seem, on that account, rather to form constituent and essential *elements* of reason, than *objects* with which reason is conversant. The import of this last remark will appear more clearly afterwards.

The primary truths to which I mean to confine my attention at present are, 1. Mathematical Axioms: 2. Truths (or more properly speaking, Laws of Belief,) inseparably connected with the exercise of Consciousness, Perception, Memory, and Reasoning.—Of some additional laws of Belief, the truth of which is tacitly recognised in all our reasonings concerning contingent events, I shall have occasion to take notice under a different article.

SECTION I.

OF MATHEMATICAL AXIOMS.

I have placed this class of truths at the head of the enumeration, merely because they seem likely, from the place which they hold in the elements of geometry, to present to my readers a more interesting and at the same time an easier subject of discussion, than some of the more abstract and latent elements of our knowledge, afterwards to be considered. In other respects, a different arrangement might perhaps have possessed some advantages, in point of strict logical method.

I.

On the evidence of mathematical axioms it is unnecessary to enlarge, as the controversies to which they have given occasion are entirely of a speculative, or rather scholastic description; and have no tendency to affect the certainty of that branch of science to which they are supposed to be subservient.

It must at the same time be confessed, with respect to this class of propositions (and the same remark may be extended to axioms in general,) that some of the logical questions connected with them continue still to be involved in much obscurity. In proportion to their extreme simplicity is the difficulty of illustrating or of describing their nature in unexceptionable language; or even of ascertaining a precise criterion by which they may be distinguished from other truths which approach to them nearly. It is chiefly owing to this, that, in geometry, there are no theorems of which it is so difficult to give a rigorous demonstration, as those, of which persons unacquainted with the nature of mathematical evidence are apt to say, that they require no proof whatever. But the inconveniences arising from these circumstances are of trifling moment; occasioning, at the worst, some embarrassment to those mathematical writers, who are studious of the most finished elegance in their exposition of elementary principles; or to metaphysicians, anxious to display their subtilty upon points which cannot possibly lead to any practical conclusion.

It was long ago remarked by Locke, of the axioms of geometry, as stated by Euclid, that although the proposition be at first enunciated in *general* terms, and afterwards appealed to, in its *particular* applications, as a principle *previously* examined and admitted, yet that the truth is not less evident in the latter case than in the former. He observes farther, that it is in some of its particular applications, that the truth of every axiom is originally perceived by the mind; and, therefore, that the general proposition, so far from being the *ground* of our assent to the truths which it comprehends, is only a verbal generalization of what, in particular instances, has been already acknowledged as true.

The same author remarks, that some of these axioms "are no "more than bare verbal propositions, and teach us nothing but the "respect and import of names one to another. The *whole is equal* "*to all its parts:* what real truth, I beseech you, does it teach us? "What more is contained in that maxim, than what the signification "of the word *totum*, or the *whole* does of itself import? And he that "knows that the word *whole* stands for what is made up of all its "parts, knows very little less, than that 'the whole is equal to all "its parts.' And upon the same ground, I think, that this proposi"tion, *A hill is higher than a valley*, and several the like, may also "pass for maxims."

Notwithstanding these considerations, Mr. Locke does not object to the form which Euclid has given to his axioms, or to the place which he has assigned to them in his Elements. On the contrary, he is of opinion, that a collection of such maxims is *not without reason* prefixed to a mathematical system; in order that learners, "having in the beginning perfectly acquainted their thoughts with "these propositions made in general terms, may have them ready "to apply to all particular cases as formed rules and sayings. Not "that, if they be equally weighed, they are more clear and evident "than the instances they are brought to confirm; but that, being "more familiar to the mind, the very naming of them is enough to "satisfy the understanding." In farther illustration of this, he adds very justly and ingeniously, that "although our knowledge begins "in particulars, and so spreads itself by degrees to generals; yet, "afterwards, the mind takes quite the contrary course, and having "drawn its knowledge into as general propositions as it can, makes "them familiar to its thoughts, and accustoms itself to have recourse "to them, as to the standards of truth and falsehood."

But although, in mathematics, some advantage may be gained without the risk of any possible inconvenience, from this arrangement of axioms, it is a very dangerous example to be followed in other branches of knowledge, where our notions are not equally clear and precise; and where the force of our pretended axioms (to use Mr. Locke's words) "reaching only to the sound, and not to the "signification of the words, serves only to lead us into confusion, "mistakes, and errour." For the illustration of this remark, I must refer to Locke.

Another observation of this profound writer deserves our attention, while examining the nature of axioms;—"that they are "not the foundations on which any of the sciences is built; nor "at all useful in helping men forward to the discovery of unknown "truths."* This observation I intend to illustrate afterwards, in treating of the futility of the syllogistic art. At present I shall only add, to what Mr. Locke has so well stated, that, even in *mathematics*, it cannot with any propriety be said, that the axioms are the foundation on which the science rests; or the first principles from which its more recondite truths are deduced. Of this I have little doubt that Locke was perfectly aware; but the mistakes which some of the most acute and enlightened of his disciples have committed in treating of the same subject, convince me, that a further elucidation of it is not altogether superfluous. With this view, I shall here introduce a few remarks on a passage in Dr. Campbell's Philosophy of Rhetoric, in which he has betrayed some misapprehensions on this very point, which a little more attention to the hints already quoted from the Essay on Human Understanding might have prevented. These remarks will, I hope, contribute to place the nature of axioms, more particularly of mathematical axioms, in a different and clearer light than that in which they have been commonly considered.

"Of intuitive evidence (says Dr. Campbell) that of the following "propositions may serve as an illustration: One and four make five. "Things equal to the same thing are equal to one another. The "whole is greater than a part; and, in brief all axioms in arithme-

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* Book iv. chap. 7, § 11,—2. 3.

"tic and geometry. These are, in effect, but so many expositions "of our own general notions, taken in different views. Some of "them are no more than definitions, or equivalent to definitions. "To say, one and four make *five*, is precisely the same thing as to "say, we give the name of *five* to one added to four. In fact, they "are all in some respects reducible to this axiom, whatever is, is. "I do not say they are deduced from it, for they have in like manner "that original and intrinsic evidence, which makes them, as "soon as the terms are understood, to be perceived intuitively. "And, if they are not thus perceived, no deduction of reason will "ever confer on them any additional evidence. Nay, in point "of time, the discovery of the less general truths has the priority, "not from their superiour evidence, but solely from this considertion that the less general are sooner objects of perception to us. "But I affirm, that though not deduced from that axiom, they may "be considered as particular exemplifications of it, and coincident "with it, in as much as they are all implied in this, that the pro-"perties of our clear and adequate ideas can be no other than what "the mind clearly perceives them to be.

"But, in order to prevent mistakes, it will be necessary further "to illustrate this subject. It might be thought that, if axioms were "propositions perfectly identical, it would be impossible to advance "a step by their means, beyond the simple ideas first perceived by "the mind. And it must be owned, if the predicate of the proposi-"tion were nothing but a repetition of the subject, under the same "aspect, and in the same or synonymous terms, no conceivable ad-"vantage could be made of it for the furtherance of knowledge. "Of such propositions, for instance, as these,—seven are seven, "eight are eight, and ten added to eleven are equal to ten added to "eleven, it is manifest that we could never avail ourselves for the "improvement of science. Nor does the change of the term make "any alteration in point of utility. The propositions, twelve are a "dozen, twenty are a score, unless considered as explications of the "words *dozen* and *score*, are equally insignificant with the former. "But when the thing, though in effect coinciding, is considered under "a different aspect; when what is single in the subject is divided in "the predicate, and conversely; or when what is a whole in the one "is regarded as a part of something else in the other; such propo-"sitions lead to the discovery of innumerable and apparently remote "relations. One added to four may be accounted no other than a "definition of the word five, as was remarked above. But when I "say, 'Two added to three are equal to five,' I advance a truth "which, though equally clear, is quite distinct from the preceding. "Thus, if one should affirm, 'That twice fifteen make thirty,' and "again, that 'thirteen added to seventeen make thirty,' nobody "would pretend that he had repeated the same proposition in other "words. The cases are entirely similar. In both cases, the same "thing is predicated of ideas which, taken severally, are different.

‘ From these again result other equations, as ‘ one added to four “ are equal to two added to three, and ‘ twice fifteen are equal to “ thirteen added to seventeen.’

“ Now, it is by the aid of such simple and elementary principles, “ that the arithmetician and algebraist proceed to the most astonishing discoveries. Nor are the operations of the geometrician essentially different.”

I have little to object to these observations of Dr. Campbell, so far as they relate to arithmetic and to algebra; for, in these sciences, all our investigations amount to nothing more than to a comparison of different expressions of the same thing. Our common language indeed frequently supposes the case to be otherwise; as when an equation is defined to be, “ A proposition asserting the equality of two quantities.” It would, however, be much more correct to define it, “ A proposition asserting the equivalence of two expressions of the same quantity;” for algebra is merely a *universal arithmetic;* and the names of numbers are nothing else than collectives, by which we are enabled to express ourselves more concisely than could be done by enumerating all the units that they contain. Of this doctrine, the passage now quoted from Dr. Campbell shews that he entertained a sufficiently just and precise idea.

But, if Dr. Campbell perceived that arithmetical equations, such as “ one and four make five,” are no other than definitions, why should he have classed them with the axioms he quotes from Euclid, “ That the whole is greater than a part,” and that “ Things equal “ to the same thing are equal to one another;” propositions which, however clearly their truth be implied in the meaning of the terms of which they consist, cannot certainly, by any interpretation, be considered in the light of definitions at all analogous to the former? The former, indeed, are only explanations of the relative import of particular names; the latter are universal propositions, applicable alike to an infinite variety of instances.*

Another very obvious consideration might have satisfied Dr. Campbell, that the simple arithmetical equations which he mentions, do not hold the same place in that science which Euclid's axioms hold in geometry. What I allude to is, that the greater part of these axioms are equally essential to all the different branches of mathematics. That "the whole is greater than a part," and that "things "equal to the same thing are equal to one another," are propositions as essentially connected with our arithmetical computations, as with our geometrical reasonings; and, therefore, to explain in what manner the mind makes a transition, in the case of numbers, from the more simple to the more complicated equations, throws no light whatever on the question, *how* the transition is made, either in arithmetic or in geometry, from what are properly called axioms, to the more remote conclusions in these sciences.

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* D'Alembert also has confounded these two classes of propositions. “ What do the greater part of those axioms on which geometry prides itself amount to, but to an expression, by means of two different words or signs, of the same simple idea? He who says that two and two make four, what more does he know than another, who should content himself with saying, that two and two make two and two?” Here, a simple arithmetical equation (which is obviously a mere *definition*) is brought to illustrate a remark on the nature of geometrical axioms.—With respect to these last (I mean such axioms as Euclid has prefixed to his Elements) D'Alembert's opinion seems to coincide exactly with that of Locke, already mentioned. “ I would not be understood. nevertheless, to condemn the use of them altogether: I wish only to remark, that their utility rises no higher than this, that they render our simple ideas more familiar by means of habit, and better adapted to the different purposes to which we may have occasion to apply them.”—“ Je ne pretênds point cependant en condamner absolument l'usage: je veux seulement faire observer, à quoi il se reduit; c'est à nous rendre les idées simples plus familières par l'habitude, et plus propres aux diffèrens usages auxquels nous pouvous les appliquer.”—*Discours Préliminaire,* &c. &c.

The very fruitless attempt thus made by this acute writer to illustrate the importance of axioms as the basis of mathematical truth, was probably suggested to him by a doctrine which has been repeatedly inculcated of late, concerning the grounds of that peculiar evidence which is allowed to accompany mathematical demonstration. "All the sciences (it has been said) rest ultimately on first "principles, which we must take for granted without proof; and "whose evidence determines, both in kind and degree, the evidence "which it is possible to attain in our conclusions. In some of the "sciences, our first principles are intuitively certain; in others, "they are intuitively probable; and such as the evidence of these "principles is, such must that of our conclusions be. If our first "principles are intuitively certain, and if we reason from them consequentially, our conclusions will be demonstratively certain: but "if our principles be only intuitively probable, our conclusions will "be only demonstratively probable. In mathematics, the first principles from which we reason are a set of axioms which are not "only intuitively certain, but of which we find it impossible to conceive the contraries to be true: And hence the peculiar evidence "which belongs to all the conclusions that follow from these principles as necessary consequences."

To this view of the subject Dr. Reid has repeatedly given his sanction, at least in the most essential points; more particularly, in controverting an assertion of Locke's, that "no science is, or hath "been built on *maxims*."—"Surely (says Dr. Reid) Mr. Locke was "not ignorant of geometry, which hath been built upon maxims prefixed to the Elements, as far back as we are able to trace it. But "though they had not been prefixed, which was a matter of utility "rather than necessity, yet it must be granted, that every demonstration in geometry is grounded, either upon propositions formerly "demonstrated, or upon self-evident principles."*

On another occasion, he expresses himself thus: "I take it to be "certain, that whatever can, by just reasoning, be inferred from a "principle that is necessary, must be a necessary truth. Thus, as "the axioms in mathematics are all necessary truths, so are all the

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* Essay on Intell. Powers, p. 647, 4to edit.

"conclusions drawn from them; that is, the whole body of that "science."*

That there is something fundamentally erroneous in these very strong statements with respect to the relation which Euclid's axioms bear to the geometrical theorems which follow, appears sufficiently from a consideration which was long ago mentioned by Locke,—that from these axioms it is not possible for human ingenuity to deduce a single inference. "It was not (says Locke) the influence of those "maxims which are taken for principles in mathematics, that hath "led the masters of that science into those wonderful discoveries "they have made. Let a man of good parts know all the maxims "generally made use of in mathematics never so perfectly, and contemplate their extent and consequences as much as he pleases, he "will, by their assistance, I suppose, scarce ever come to know, "that 'the square of the hypothenuse in a right angled triangle, is "equal to the squares of the two other sides.' The knowledge that "'the whole is equal to all its parts,' and, 'if you take equals from "equals, the remainders will be equal,' helped him not, I presume, "to this demonstration: And a man may, I think, pore long enough "on those axioms, without ever seeing one jot the more of mathematical truths."† But surely, if this be granted, and if, at the same time, by the first principles of a science, be meant those fundamental propositions from which its remoter truths are derived, the axioms cannot, with any consistency, be called the First Principles of Mathematics. They have not (it will be admitted) the most distant analogy to what are called the first principles of natural philosophy;—to those general facts, for example, of the gravity and elasticity of the air, from which may be deduced, as consequences, the suspension of the mercury in the Torricellian tube, and its fall when carried up to an eminence. According to this meaning of the word, the principles of mathematical science are, *not* the axioms, but the *definitions;* which definitions hold, in mathematics, precisely the same place that is held in natural philosophy by such general facts as have now been referred to.‡

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* Ibid. p. 577. See also pp. 560, 561. 606.

† Essay on Human Understanding, Book IV. chap. xii. § 15.

‡ In order to prevent cavil, it may be necessary for me to remark here, that when I speak of mathematical axioms, I have in view only such as are of the same description with the *first nine* of those which are prefixed to the Elements of Euclid; for, in that list, it is well known, that there are several which belong to a class of propositions altogether different from the others. That "all right angles (for example) are equal to one another;" that "when one straight line falling on two other straight lines makes the two interior angles on the same side less than two right angles, these two straight lines, if produced, shall meet on the side, where are the two angles less than two right angles;" are manifestly principles which bear no analogy to such barren *truisms* as these, "Things that are equal to one and the same thing are equal to one another." "If equals be added to equals, the wholes are equal." "If equals be taken from equals, the remainders are equal." Of these propositions, the two former (the 10th and 11th axioms, to wit, in Euclid's list) are evidently theorems which, in point of strict logical accuracy, ought to be demonstrated, as may be easily done, with respect to the first, in a single sentence. That the second has not yet been proved in a simple and satisfactory manner, has been long

n what principle are the various properties of the circle d, but from the definition of a circle? From what prin- the properties of the parabola or ellipse, but from the defi- s of these curves? A similar observation may be extend- ll the other theorems which the mathematician demonstrates: t is this observation (which, obvious as it may seem, does not r to have occurred, in all its force, either to Locke, to Reid, Campbell,) that furnishes, if I mistake not, the true explanation peculiarity already remarked in mathematical evidence.*

e prosecution of this last idea properly belongs to the sub- f mathematical demonstration, of which I intend to treat af- rds. In the mean time, I trust, that enough has been said to ct those misapprehensions of the nature of axioms, which are anced by the speculations, and still more by the phraseolo- f some late eminent writers. On this article, my own opinion des very nearly with that of Mr. Locke—both in the view he has given of the nature and use of axioms in geometry, what he has so forcibly urged concerning the danger, in other es of knowledge, of attempting a similar list of *maxims*, with- due regard to the circumstances by which different sciences stinguished from one another. With Mr. Locke, too, I must ave to guard myself against the possibility of being misun- od in the illustrations which I have offered of some of his And for this purpose, I cannot do better than borrow his “In all that is here suggested concerning the little use of ms for the improvement of knowledge, or dangerous use in termined ideas, I have been far enough from saying or intend- they should be laid aside, as some have been too forward to ge me. I affirm them to be truths, self-evident truths; and annot be laid aside. As far as their influence will reach, it is ain to endeavour, nor would I attempt to abridge it. But yet, hout any injury to truth or knowledge, I may have reason to k their use is not answerable to the great stress which seems e laid on them, and I may warn men not to make an ill use of n, for the confirming themselves in errour."†

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red as a sort of reproach to mathematicians; and I have little doubt that this re- will continue to exist, till the basis of the science be somewhat enlarged, by the ntion of one or two new definitions, to serve as additional principles of geometrical ing.

me farther remarks on Euclid's Axioms, see note (A.)

dition of Euclid to which I uniformly refer, is that of David Gregory. Oxon.

Alembert, although he sometimes seems to speak a different language, approached to this *view* of the subject when he wrote the following passage: ally, it is not without reason that mathematicians consider *definitions* as *princi-* nce it is on clear and precise definitions that our knowledge rests in those sciences, our reasoning powers have the widest field opened for their exercise."—"Au n'est pas sans raison que les mathématiciens regardent les définitions comme cipes, puisque, dans les sciences ou le raisonnement a la meilleure part, c'est sur finitions nettes et exactes que nos connoissances sont appuyées." [illegible] *Elemens de* . 4.

† Locke's Essay, Book IV. ch. vii. § 14.

After what has been just stated, it is scarcely necessary for me again to repeat, with regard to mathematical axioms, although they are not the *principles* of our reasoning, either in arithmetic or in geometry, their truth is supposed or implied in all our reasonings in both; and, if it were called in question, our further progress would be impossible. In both of these respects, we shall find them analogous to the other classes of primary or elementary truths which remain to be considered.

Nor let it be imagined, from this concession, that the dispute turns merely on the meaning annexed to the word *principle*. It turns upon an important question of fact; Whether the theorems of geometry rest on the *axioms*, in the same sense in which they rest on the *definitions?* or (to state the question in a manner still more obvious,) Whether axioms hold a place in geometry at all analogous to what is occupied in natural philosophy, by those sensible phenomena, which form the basis of that science? Dr. Reid compares them sometimes to the one set of propositions and sometimes to the other.* If the foregoing observations be just, they bear no analogy to either.

Into this indistinctness of language, Dr. Reid was probably led in part by Sir Isaac Newton, who, with a very illogical latitude in the use of words, gave the name of *axiom* to the *laws of motion*,† and also to those general experimental truths which form the groundwork of our general reasonings in catoptrics and dioptrics. For such a misapplication of the technical terms of mathematics some apology might perhaps be made, if the author had been treating on any subject connected with moral science; but surely, in a work entitled "Mathematical Principles of Natural Philosophy," the word *axiom* might reasonably have been expected to be used in a sense somewhat analogous to that which every person liberally educated is accustomed to annex to it, when he is first initiated into the elements of geometry.

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* "Mathematics, once fairly established on the foundation of a few *axioms and definitions*, as upon a rock, has grown from age to age, so as to become the loftiest and the most solid fabric that human reason can boast."—*Essays on Int. Powers*, p. 561, 4to edition.

"Lord Bacon first delineated the only solid foundation on which natural philosophy can be built; and Sir Isaac Newton reduced the principles laid down by Bacon into three or four *axioms*, which he calls *regulae philosophandi*. From these, *together with the phenomena observed by the senses, which he likewise lays down as first principles*, he deduces, by strict reasoning, the propositions contained in the third book of his Principia, and in his Optics; and by this means has raised a fabric, which is not liable to be shaken by doubtful disputation, but stands immoveable on the basis of self-evident principles."—Ibid. See also pp. 647, 648.

† Axiomata, sive leges Motus. Vid. *Philosophiae Naturalis Principia Mathematica.*

At the beginning, too, of Newton's Optics, the title of axioms is given to the following propositions:

"AXIOM I.

"The angles of reflection and refraction lie in one and the same plane with the angle of incidence.

"AXIOM II.

"The angle of reflection is equal to the angle of incidence.

"AXIOM III.

"If the refracted ray be turned directly back to the point of incidence, it shall be refracted into the line before described by the incident ray.

"AXIOM IV.

"Refraction out of the rarer medium into the denser, is made towards the perpendicular, that is, so that the angle of refraction be less than the angle of incidence.

"AXIOM V.

"The sine of incidence is either accurately, or very nearly, in a given ratio to the sine of refraction."

When the word *axiom* is understood by one writer in the sense annexed to it by Euclid, and by [illegible] antagonist in the sense here given to it by Sir Isaac Newton, it is not surprising that there should be apparently a wide diversity between their opinions concerning the logical importance of this class of propositions.

The question to which the preceding discussion relates is of the greater consequence, as the prevailing mistake, with respect to the nature of mathematical axioms, has contributed much to the support of a very erroneous theory concerning mathematical evidence, which is, I believe, pretty generally adopted at present,—that it all resolves ultimately into the perception of *identity;* and that it is this circumstance which constitutes the peculiar and characteristical cogency of mathematical demonstration.

Of some of the other arguments which have been alleged in favour of this theory, I shall afterwards have occasion to take notice. At present, it is sufficient for me to remark, (and this I flatter myself I may venture to do with some confidence, after the foregoing reasonings,) that in so far as it rests on the supposition that all geometrical truths are ultimately derived from Euclid's axioms, it proceeds on an assumption totally unfounded in fact, and indeed so obviously false, that nothing but its antiquity can account for the facility with which it continues to be admitted by the learned.[*]

SECTION I.

II.

Continuation of the same Subject.

THE difference of opinion between Locke and Reid, of which I took notice in the foregoing part of this section, appears greater than it really is, in consequence of an ambiguity in the word *principle*, as employed by the latter. In its proper acceptation, it seems to me to denote an assumption (whether resting on fact or on hypothesis,) upon which, as a *datum*, a train of reasoning proceeds; and for the falsity or incorrectness of which no logical rigour in the subsequent process can compensate. Thus the gravity and the elasticity of the air are *principles of reasoning* in our speculations about the barometer. The equality of the angles of incidence and reflection; the proportionality of the sines of incidence and refraction; are *principles of reasoning* in catoptrics and in dioptrics. In a sense perfectly analogous to this, the *definitions* of geometry (all of which are merely *hypothetical*) are the *first principles* of reasoning in the subsequent demonstrations, and the basis on which the whole fabric of the science rests.

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[*] A late Mathematician, of considerable ingenuity and learning, doubtful, it should seem, whether Euclid had laid a sufficiently broad foundation for mathematical science in the axioms prefixed to his Elements, has thought proper to introduce several new ones of his own invention. The first of these is, that "Every quantity is equal to itself;" to which he adds, afterwards, that "A quantity expressed one way is equal to itself expressed any other way."—*See Elements of Mathematical Analysis, by Professor Vilant of St. Andrew's.* We are apt to smile at the formal statement of these propositions; and yet, according to the theory alluded to in the text, it is in truths of this very description that the whole science of mathematics not only begins but ends. "Omnes mathematicorum "propositiones sunt identicae, et repraesentantur hac formula, a =a."[†] This sentence, which I quote from a dissertation published at Berlin about fifty years ago, expresses, in a few words, what seems to be now the prevailing opinion, (more particularly on the continent) concerning the nature of mathematical evidence. The remarks which I have to offer upon it I delay till some other questions shall be previously considered.

[†] [All the propositions of mathematicians are identical, and are represented by this formula, a =a.]

I have called this the *proper* acceptation of the word, because it is that in which it is most frequently used by the best writers. It is also most agreeable to the literal meaning which its etymology suggests, expressing the original point from which our reasoning sets out or commences.

Dr. Reid often uses the word in this sense, as, for example, in the following sentence, already quoted: “From three or four axioms, “which he calls *regulae philosophandi*, together with *the phenomena* “*observed by the senses, which he likewise lays down as first principles*, “Newton deduces, by strict reasoning, the propositions contained in “the third book of his Principia, and in his Optics.”

On other occasions, he uses the same word to denote those *elemental* truths (if I may use the expression,) which are virtually taken for granted or assumed, in every step of our reasoning; and without which, although no *consequences* can be directly inferred from them, a train of reasoning would be impossible. Of this kind, in mathematics, are the *axioms*, or (as Mr. Locke and others frequently call them,) the *maxims*; in physics, a belief of *the continuance of the laws of nature*;—in all our reasonings, without exception, a belief in *our own identity*, and in *the evidence of memory*. Such truths are the *last elements* into which reasoning revolves itself, when subjected to a metaphysical analysis; and which no person but a metaphysician or a logician ever thinks of stating in the form of propositions, or even of expressing verbally to himself. It is to truths of this description that Locke seems in general to apply the name of *maxims*; and, in this sense, it is unquestionably true, that no science (not even geometry) is founded on maxims as its first principles.

In one sense of the word *principle*, indeed, maxims may be called principles of reasoning; for the words *principles* and *elements* are sometimes used as synonymous. Nor do I take upon me to say that this mode of speaking is exceptionable. All that I assert is, that they cannot be called *principles of reasoning*, in the sense which has just now been defined; and that accuracy requires, that the word, on which the whole question hinges, should not be used in both sensa, in the course of the same argument. It is for this reason that I have employed the phrase *principles of reasoning* on the one occasion, and *elements of reasoning* on the other.

It is difficult to find unexceptionable language to mark distinctions so completely foreign to the ordinary purposes of speech; but, in the present instance, the line of separation is strongly and clearly drawn by this criterion,—that from *principles of reasoning*, consequences may be deduced; from what I have called *elements of reasoning*, none ever can.

A process of logical reasoning has been often likened to a chain supporting a weight. If this similitude be adopted, the *axioms* or *elemental truths* now mentioned, may be compared to the successive concatenations which connect the different links immediately with each other; the *principles* of our reasoning resemble the hook, or rather the beam, from which the whole is suspended.

The foregoing observations, I am inclined to think, coincide with what was, at bottom, Mr. Locke's opinion on this subject. That he has not stated it with his usual clearness and distinctness, it is impossible to deny; at the same time, I cannot subscribe to the following severe criticism of Dr. Reid:

"Mr. Locke has observed, 'That intuitive knowledge is necessary *to connect* all the steps of a demonstration.'

"From this, I think, it necessarily follows, that in every branch of knowledge, we must make use of truths that are intuitively known, in order to *deduce from them* such as require proof.

"But I cannot reconcile this with what he says (section 8th of the same chapter:) 'The necessity of this intuitive knowledge in every step of scientifical or demonstrative reasoning, gave occasion, I imagine, to that mistaken axiom, that all reasoning was *ex praecognitis et praeconcessis*, which how far it is mistaken I shall have occasion to show more at large, when I come to consider propositions, and particularly those propositions which are called maxims, and to show that it is by a mistake that they are supposed to be the foundation of all our knowledge and reasonings.'"[*]

The distinction which I have already made between *elements* of reasoning, and *first principles* of reasoning, appears to myself to throw much light on these apparent contradictions.

That the seeming difference of opinion on this point between these two profound writers, arose chiefly from the ambiguities of language, may be inferred from the following acknowledgment of Dr. Reid, which immediately follows the last quotation:

"I have carefully examined the chapter on maxims, which Mr. Locke here refers to, and though one would expect, from the quotation last made, that it should run contrary to what I have before delivered concerning first principles, I find only two or three sentences in it, and those chiefly incidental, to which I do not assent."[†]

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[*] Essays on Int. Powers, p. 643, 4to. edit.

[†] Ibid.

Before dismissing this subject, I must once more repeat, that the doctrine which I have been attempting to establish, so far from degrading *axioms* from that rank which Dr. Reid would assign them, tends to identify them still more than he has done with the exercise of our reasoning powers; in as much as, instead of comparing them with the *data*, on the accuracy of which that of our conclusion necessarily depends, it considers them as the *vincula* which give coherence to all the particular links of the chain; or, (to vary the metaphor) as *component elements*, without which the faculty of reasoning is inconceivable and impossible.*

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* D'Alembert has defined the word *principle* exactly in the sense in which I have used it; and has expressed himself (at least on one occasion) nearly as I have done, on the subject of axioms. He seems however on this, as well as on some other logical and metaphysical questions, to have varied a little in his views (probably from mere forgetfulness) in different parts of his writings.

"What then are the truths which are entitled to have a place in the elements of philosophy? They are of two kinds; *those which form the head of each part of the chain*, and those which are to be found at the points where different branches of the chain unite together.

"Truths of the first kind are distinguished by this—that they do not depend on any other truths, and that they possess within themselves the whole grounds of their evidence. Some of my readers will be apt to suppose, that I here mean to speak of *axioms*; but these are not the truths which I have at present in view. With respect to this last class of *principles*, I must refer to what I have elsewhere said of them; that, notwithstanding their truth, they add nothing to our information; and that the palpable evidence which accompanies them, amounts to nothing more than to an expression of the same idea by means of two different terms. On such occasions, the mind only turns to no purpose about its own axis, without advancing forward a single step. Accordingly, *axioms* are so far from holding the highest rank in philosophy, that they scarcely deserve the distinction of being formally enunciated."

"Or quelles sont les vérités qui doivent entrer dans des élémens de philosophie? Il y en a de deux sortes; *celles qui forment la tête de chaque partie de la chaine*, et celles qui se trouvent au point de reunion de plusieurs branches.

"Les vérités du premier genre ont pour caractère distinctif de ne dépendre d'aucune autre, et de n'avoir de preuves que dans elles-mêmes. Plusieurs lecteurs croiront que nous voulons parler *des axioms*, et ils se tromperont; nous les renvoyons à ce qui nous en avons dit ailleurs, que *ces sortes de principes* ne nous apprennent rien à force d'être vrais, et que leur evidence palpable et grossière se reduit à exprimer la meme idée par deux termes differens, l'esprit ne fait alors autre chose que tourner inutilement sur lui-même sans avancer d'un seul pas. Ainsi les axioms bien loin de tenir en philosophie le premier rang, n'ont pas même besoin d'être enoncés."—*Elem. de Phil.* pp. 24, 25.]

Although in the foregoing passage, D'Alembert, in compliance with common phraseology, has bestowed the name of *principles* upon *axioms*, it appears clearly, from a question which occurs afterwards, that he did not consider them as well entitled to this appellation. "What are then," he asks, "in each science, the *true principles* from which we ought to set out?" ("Quels sont donc dans chaque science les *vrais principes* d'ou l'on doit partir?") The answer he gives to this question agrees with the doctrinė I have stated in every particular, excepting in this, that it represents, (and in my opinion very incorrectly) the principles of geometrical science to be (not definitions or hypotheses, but) those simple and acknowledged *facts*, which our senses perceive with respect to the properties of *extension*. "The *true principles* from which we ought to set out in the different sciences, are simple and acknowledged *facts*, which do not presuppose the existence of any others, and which, of course, it is equally vain to attempt explaining or confuting; in physics, the familiar phenomena which daily experience presents to every eye; in *geometry*, *the sensible properties of extension*; in mechanics, the impenetrability of bodies, upon which their mutual actions depend; in metaphysics, the results of our sensations; in morals, the original and common affections of the human race."—["Les vrais principes d'ou l'on doit partir dans chaque science, sont des faits simples et reconnus, qui n'en supposent point d'autres, et qu'on ne puisse par consequent ni expliquer ni contester; en physique, les phénomenes journaliers que l'observation découvre à tous les yeux; *en géometrie les propriétés sensibles de l'etendue*; en mechanique, l'impenetrabilité des corps, source de leur action

SECTION II.

Of certain Laws of Belief, inseparably connected with the exercise of Consciousness, Memory, Perception, and Reasoning.

1. It is by the immediate evidence of consciousness that we are assured of the *present existence* of our various sensations, whether pleasant or painful; of all our affections, passions, hopes, fears, desires, and volitions. It is thus too we are assured of the *present existence* of those thoughts which, during our waking hours, are continually passing through the mind, and of all the different effects which they produce in furnishing employment to our intellectual faculties.

According to the common doctrine of our best philosophers,* it is by the evidence of *consciousness* we are assured that we ourselves exist. The proposition, however, when thus stated, is not accurately true; for our own existence (as I have elsewhere observed,)† is not a direct or immediate object of consciousness, in the strict and logical meaning of that term. We are conscious of sensation, thought, desire, volition; but we are not conscious of the existence of mind itself; nor would it be possible for us to arrive at the knowledge of it (supposing us to be created in the full possession of all the intellectual *capacities* which belong to human nature,) if no impression were ever to be made on our external senses. The moment that, in consequence of such an impression, a sensation is excited, we learn two facts at once;—the existence of the sensation, and our own existence as sentient beings;—in other words, the very first exercise of consciousness necessarily implies a belief, not only of the present existence of what is felt, but of the present existence of *that* which feels and thinks; or, (to employ plainer language) the present existence of that being which I denote by the words *I* and *myself*. Of these facts, however, it is the former alone of which we can properly be said to be conscious, agreeably to the rigorous interpretation of the expression. A conviction of the latter, although it seems to be so inseparable from the exercise of consciousness, that it can scarcely be considered as posterior to it in the order of *time*, is yet (if I may be allowed to make use of a scholastic distinction) posterior to it in the order of *nature;* not only as it supposes consciousness to be already awakened by some sensation, or some other mental affection; but as it is evidently rather a judgment accompanying the exercise of that power, than one of its immediate intima-

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mutuelle; en metaphysique, le résultat de nos sensations: en morale, les affections premières et communes à tous les hommes."—pp. 26, 27.]

In cases of this sort, where so much depends on extreme precision and nicety in the use of words, it appears to me to be proper to verify the fidelity of my translations by subjoining the original passages.

* See, in particular, Campbell's Philosophy of Rhetoric.

† Philosophical Essays, 4to edit. p. 7.

tions concerning its appropriate class of internal phenomena. It appears to me, therefore, more correct, to call the belief of our own existence a concomitant or accessory of the exercise of consciousness, than to say, that our existence is a fact falling under the immediate cognisance of consciousness, like the existence of the various agreeable or painful sensations which external objects excite in our minds.

2. That we cannot, without a very blameable latitude in the use of words, be said to be *conscious* of our personal identity, is a proposition still more indisputable; in as much as the very idea of personal identity involves the idea of *time*, and consequently presupposes the exercise not only of *conciousness*, but of *memory*. The belief connected with this idea is implied in every thought and every action of the mind, and may be justly regarded as one of the simplest and most essential elements of the understanding. Indeed it is impossible to conceive either an intellectual or an active being to exist without it. It is, however, extremely worthy of remark, with respect to this belief, that, universal as it is among our species, nobody but a metaphysician ever thinks of expressing it in words, or of reducing into the shape of a proposition, the truth to which it relates. To the rest of mankind, it forms not an object of knowledge; but a condition or supposition, necessarily and unconsciously involved in the exercise of all their faculties. On a part of our constitution, which is obviously one of the last or primordial elements at which it is possible to arrive in analyzing our intellectual operations, it is plainly unphilosophical to suppose, that any new light can be thrown by metaphysical discussion. All that can be done with propriety, in such cases, is to state the fact.

And here, I cannot help taking notice of the absurd and inconsistent attempts which some ingenious men have made, to explain the gradual process by which they suppose the mind to be led to the knowledge of its own existence, and of that continued identity which our constitution leads us to ascribe to it. How (it has been asked) does a child come to form the very abstract and metaphysical idea expressed by the pronoun I or *moi?* In answer to this question, I have only to observe, that when we set about the explanation of a phenomenon, we must proceed on the supposition that it is possible to resolve it into some more general law or laws with which we are already acquainted. But, in the case before us, how can this be expected by those, who consider that all our knowledge of mind is derived from the exercise of reflection; and that every act of this power implies a conviction of our own existence as reflecting and intelligent beings? Every theory, therefore, which pretends to account for this conviction, must necessarily involve that sort of paralogism which logicians call a *petitio principii;* in as much as it must resolve the thing to be explained into some law or laws, the evidence of which rests ultimately on the assumption in question. From this assumption, which is necessarily implied in the joint exercise of consciousness and memory, the philosophy of the human mind, if we mean to study it analytically, must of necessity set out; and the very attempt to dig deeper for its foundation, betrays a total ignorance of the logical rules, according to which alone it can ever be prosecuted with any hopes of success.

It was, I believe, first remarked by M. Prevost of Geneva, (and the remark, obvious as it may appear, reflects much honour on his acuteness and sagacity) that the inquiries concerning the mind, founded on the hypothesis of the *animated statue*—inquiries which both Bonnet and Condillac professed to carry on analytically,—were in truth altogether synthetical. To this criticism it may be added, that their inquiries, in so far as they had for their object to explain the origin of our belief of our own existence, and of our personal identity, assumed, as the principles of their synthesis, facts at once less certain and less familiar than the problem which they were employed to resolve.

Nor is it to the metaphysician only, that the ideas of identity and of personality are familiar. Where is the individual who has not experienced their powerful influence over his imagination, while he was employed in reflecting on the train of events which have filled up the past history of his life; and on that internal world, the phenomena of which have been exposed to his own inspection alone? On such an occasion, even the wonders of external nature seem comparatively insignificant; and one is tempted (with a celebrated French writer) in contemplating the spectacle of the universe, to adopt the words of the Doge of Genoa when he visited Versailles—"Ce qui m'etonne le plus ici, c'est de m'y voir."*

3. The belief which all men entertain of the existence of the material world, (I mean their belief of its existence independently of that of percipient beings,) and their expectation of the continued uniformity of the laws of nature, belong to the same class of ultimate or elemental laws of thought with those which have been just mentioned. The truths which form their objects are of an order so radically different from what are commonly called *truths*, in the popular acception of that word, that it might perhaps be useful for logicians to distinguish them by some appropriate appellation, such, for example, as that of *metaphysical* or *transcendental* truths. They are not *principles* or *data* (as will afterwards appear) from which any consequence can be deduced; but form a part of those original *stamina* of human reason, which are equally essential to all the pursuits of science, and to all the active concerns of life.

4. I shall only take notice farther, under this head, of the confidence which we must necessarily repose in the evidence of memory (and, I may add, in the continuance of our personal indentity) when we are employed in carrying on any process of deduction or argumentation;—in following out, for instance, the steps of a long mathematical demonstration. In yielding our assent to the conclusion to which such a demonstration leads, we evidently trust to the fidelity

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* [What most surprises me in this place, is to see myself here.] D'Alembert, Apologie de l'Etude.

with which our memory has connected the different links of the chain together. The reference which is often made, in the course of a demonstration, to propositions formerly proved, places the same remark in a light still stronger; and shews plainly that, in this branch of knowledge, which is justly considered as the most certain of any, the authority of the same laws of belief which are recognised in the ordinary pursuits of life, is tacitly acknowledged. Deny the evidence of memory as a ground of certain knowledge, and you destroy the foundations of mathematical science as completely as if you were to deny the truth of the axioms assumed by Euclid.

The foregoing examples sufficiently illustrate the nature of that class of truths which I have called *Fundamental Laws of Human Belief*, or *Primary Elements of Human Reason*. A variety of others, not less important, might be added to the list;* but these I shall not at present stop to enumerate, as my chief object, in introducing the subject here, was to explain the common relation in which they all stand to deductive evidence. In this point of view, two analogies, or rather coincidences, between the truths which we have been last considering, and the mathematical axioms which were treated of formerly, immediately present themselves to our notice.

1. From neither of these classes of truths can any direct inference be drawn for the farther enlargement of our knowledge. This remark has been already shown to hold universally with respect to the axioms of geometry; and it applies equally to what I have called Fundamental Laws of Human Belief. From such propositions as these,—*I exist; I am the same person to-day that I was yesterday; the material world has an existence independent of my mind; the general laws of nature will continue, in future, to operate uniformly as in time past*,—no inference can be deduced, any more than from the intuitive truths prefixed to the Elements of Euclid. Abstracted from other *data*, they are perfectly barren in themselves; nor can any possible combination of them help the mind forward, one single step, in its progress. It is for this reason, that instead of calling them, with some other writers, *first principles*, I have distinguished them by the title of *fundamental laws of belief;* the former word seeming to me to denote, according to common usage, some *fact*, or some *supposition*, from which a series of consequences may be deduced.

If the account now given of these *laws of belief* be just, the great argument which has been commonly urged in support of their authority, and which manifestly confounds them with what are properly called *principles of reasoning*,† is not at all applicable to the subject;

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* Such, for example, as our belief of the existence of *efficient* causes; our belief of the existence of other intelligent beings besides ourselves, &c. &c.

† Aristotle himself has more than once made this remark; more particularly, in discussing the absurd question, Whether it be possible for the same thing to be and not to be? *αξιουσι δη και τουτο αποδεικνυναι τινες δι' απαιδευσιαν. εστι γαρ απαιδευσια, το μη γινωσκειν τινων δει ζητειν αποδειξιν, και τινων ου δει. ὁλως μεν γαρ ἁπαντων αδυνατον αποδειξιν ειναι. εις απειρον γαρ αν βαδιζοι· ʼωστε μηδ' ὁυτως ειναι αποδειξιν.—Aristot. Metaphys.* Vol. II. p. 873. Edit. Du Val.

t does not rest the point in dispute upon its right founda-
there were no first principles (it has been said) or, in other
a reason could be given for every thing, no process of
could possibly be brought to a conclusion. The remark
tably true; but it only proves (what no logician of the
times will venture to deny) that the mathematician could
nstrate a single theorem, unless he where first allowed to
his definitions; nor the natural philosopher explain or
or a single phenomenon, unless he were allowed to assume,
wledged facts, certain general laws of nature. What infer-
this afford in favour of that particular class of truths to
he preceding observations relate, and against which the in-
f modern sceptics has been more particularly directed? If
ceived, these truths are still more intimately connected
operations of the reasoning faculty than has been general-
ed; not as the *principles* (αρχαι) from which our reasonings
nd on which they ultimately depend; but as the necessary
on which every step of the deduction tacitly proceeds; or
f I may use the expression) as essential elements which
the composition of reason itself.

his last remark I have anticipated, in some measure, what
state with respect to the *second* coincidence alluded to,
mathematical axioms, and the other propositions which I
prehended under the general title of *fundamental laws of
lief*. As the truth of axioms is virtually presupposed or
the successive steps of every demonstration, so, in every
r reasonings concerning the order of Nature, we proceed
pposition, that the laws by which it is regulated will
niform as in time past; and that the material universe
istence independent of our perceptions. I need scarcely
, in all our reasonings whatever, whether they relate to
or to contingent truths, our own personal identity and
ence of memory are virtually taken for granted. These
truths all agree in this, that they are essentially involved
ercise of our rational powers; although, in themselves,
ish no *principles* or *data* by which the sphere of our
e can, by any ingenuity, be enlarged. They agree
being tacitly acknowledged by all men, learned or igno-
hout any formal enunciation in words, or even any con-

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e are some who, through ignorance, make an attempt to prove even this
at it is impossible for the same thing to be and not to be.) For it is a mark
not to be able to distinguish those things which ought to be demonstrated
f which no demonstration should be attempted. In truth, it is altogether
at every thing should be susceptible of demonstration; otherwise the pro-
tend to infinity, and, after all our labour, nothing would be gained." In
immediately preceding this quotation, Aristotle calls the maxim in ques-
των αρχων πασων, "the most certain of all *principles*."

e purpose, Dr. Reid has said: "I hold it to be certain, and even demonstra-
knowledge got by reasoning must be built on first principles. This (he adds)
as that every house must have a foundation."—*Essays on Int. Powers*, p.

scious exercise or reflection. It is only at that period of our intellectual progress when scientific arrangements and metaphysical refinements begin to be introduced, that they become objects of attention to the mind, and assume the form of propositions.

In consequence of these two analogies or coincidences, I should have been inclined to comprehend under the general title of axioms, all the truths which have been hitherto under our review, if the common usage of our language had not, in a great measure, appropriated that appellation to the axioms of mathematics; and if the view of the subject which I have taken, did not render it necessary for me, to direct the attention of my readers to the wide diversity between the branches of knowledge to which they are respectively subservient.

I was anxious also to prevent these truths from being all identified, in point of logical importance, under the same name. The fact is, that the one class, (in consequence of the relation in which they stand to the demonstrative conclusions of geometry,) are comparatively of so little moment, that the formal enumeration of them was a matter of choice rather than of necessity; whereas the other class have unfortunately been raised, by the sceptical controversies of modern times, to a conspicuous rank in the philosophy of the human mind. I have thought it more advisable, therefore, to bestow on the latter an appropriate title of their own; without however going so far, as to reject altogether the phraseology of those who have annexed to the word *axiom* a more enlarged meaning than that which I have usually given to it. Little inconvenience, indeed, can arise from this latitude in the use of the term; provided only it be always confined to those ultimate laws of belief, which, although they form the first elements of human reason, cannot with propriety be ranked among the principles from which any of our scientific conclusions are deduced.

Corresponding to the extension which some late writers have given to *axioms*, is that of the province which they have assigned to *intuition*; a term which has been applied, by Dr. Beattie and others, not only to the power by which we perceive the truth of the axioms of geometry, but to that by which we recognize the authority of the fundamental laws of belief, when we hear them enunciated in language. My only objection to this use of the word is, that it is a departure from common practice; according to which, if I be not mistaken, the proper objects of intuition are propositions analogous to the axioms prefixed to Euclid's Elements. In some other respects, this innovation might perhaps be regarded as an improvement on the very limited and imperfect vocabulary of which we are able to avail ourselves in our present discussions.*

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* According to Locke, we have the knowledge of our own existence by *intuition*; of the existence of God by *demonstration*; and of other things by *sensation*. Book iv. Chap. 9. § 2.

This use of the word *intuition* seems to be somewhat arbitrary. The reality of our own existence is a truth which bears as little analogy to the axioms of mathematics, as any

To the class of truths which I have here called *laws of belief*, or *elements of reason* the title of *principles of common sense* was long ago given by Father Buffier, whose language and doctrine concerning them bears a very striking resemblance to those of some of our later Scottish logicians. This, at least, strikes me as the meaning which these writers *in general* annex to the phrase; although all of them have frequently employed it with a far greater degree of latitude. When thus limited in its acceptation, it is obviously liable, in point of scientific accuracy, to two very strong objections, both of which have been already sufficiently illustrated. The first is, that it applies the appellation of *principles* to laws of belief from which no inference can be deduced; the second, that it refers the origin of these laws to common sense.[*]—Nor is this phraseology more agreeable to popular use than to logical precision. If we were to suppose an individual, whose conduct betrayed a disbelief of his own existence, or of his own identity, or of the reality of surrounding objects, it would by no means amount to an adequate description of his condition to say, that he was destitute of *common sense*. We should at once pronounce him to be destitute of *reason*, and would no longer consider him as a fit subject of discipline or of punishment. The former expression, indeed, would only imply that he was apt to fall into absurdities and improprieties in the common concerns of life. To denominate, therefore, such laws of belief as we have now been considering, *constituent elements of human reason*, while it seems quite unexceptionable in point of technical distinctness, cannot be justly censured as the slightest deviation from our habitual forms of speech. On the same grounds, it may be fairly questioned, whether the word *reason* would not, on some occasions, be the best substitute which our language affords for *intuition*, in that enlarged acceptation which has been given to it of late. If not quite so definite and precise as might be wished, it would be at least employed in one of those significations in which it is already familiar to every ear; whereas the meaning of *intuition*, when used for the same purpose, is stretched very far beyond its ordinary limits. And in cases of this sort, where we have to choose between two terms, neither of which is altogether unexceptionable, it will be found much safer to trust to the context for restricting, in the reader's mind, what is too general, than for enlarging what use has accustomed us to interpret in a sense too narrow.

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other primary truth whatever. If the province of *intuition*, therefore, be extended as far as it has been carried by Locke in the foregoing sentence, it will not be easy to give a good reason why it should not be enlarged a little farther. The words *intuition* and *demonstration*, it must not be forgotten, have, both of them, an etymological reference to the sense of seeing; and when we wish to express, in the strongest terms, the most complete evidence which can be set before the mind, we compare it to the light of noon-day; —in other words, we compare it to what Mr. Locke here attempts to degrade, by calling it the *evidence of sensation*.

[*] See the preceding part of this section, with respect to the word *principle*; and the Account of Reid's Life, for some remarks on the proper meaning of the phrase *common sense*.

I must add, too, in opposition to the high authorities of Dr. Johnson and Dr. Beattie,[*] that, for many years past, *reason* has been very seldom used by philosophical writers, or indeed by correct writers of any description, as synonymous with the power of reasoning. *To appeal to the light of human reason from the reasonings of the schools*, is surely an expression to which no good objection can be made, on the score either of vagueness or of novelty. Nor has the etymological affinity between these two words the slightest tendency to throw any obscurity on the foregoing expression. On the contrary, this affinity may be of use in some of our future arguments, by keeping constantly in view the close and inseparable connexion, which will be afterwards shown to exist between the two different intellectual operations which are thus brought into immediate contrast.

The remarks which I have stated in the two preceding sections, comprehend every thing of essential importance which I have to offer on this article of logic. But the space which it has occupied for nearly half a century, in some of the most noted philosophical works which have appeared in Scotland, lays me under the necessity, before entering on a new topic, of introducing, in this place, a few critical scrictures on the doctrines of my predecessors.

SECTION III.

Continuation of the Subject.—Critical Remarks on some late Controversies to which it has given rise.—Of the Appeals which Dr. Reid and some other Modern Writers have made, in their Philosophical Discussions to Common Sense, as a Criterion of Truth.

I observed, in a former part of this work, that Dr. Reid acknowledges the Berkeleian system to be a logical consequence of the opinions universally admitted by the learned at the time when Berkeley wrote. In the earlier part of his own life, accordingly, he informs us, that he was actually a convert to the scheme of immaterialism; a scheme which he probably considered as of a perfectly inoffensive tendency, as long as he conceived the existence of the material world to be the only point in dispute. Finding, however, from Mr. Hume's writings, that, along with this paradox, the ideal theory necessarily involved various other consequences of a very different nature, he was led to a careful examination of the data on which it rested; when he had the satisfaction to discover that its only foundation was a *hypothesis*, unsupported by any evidence whatever but the authority of the schools.[*]

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[*] Dr. Johnson's definition of Reason was before quoted. The following is that given by Dr. Beattie:

"Reason is used by those who are most accurate in distinguishing, to signify that power of the human mind by which we draw inferences, or by which we are convinced, that a relation belongs to two ideas, on account of our having found that these ideas bear certain relations to other ideas. In a word, it is that faculty which enables us, from relations or ideas that are known, to investigate such as are unknown, and without which we never could proceed in the discovery of truth a single step beyond first principles or intuitive axioms."—*Essay on Truth*, Part I. Chap. i.

From this important concession of a most impartial and competent judge, it may be assumed as a fact, that, till the refutation of the ideal theory in his own "Inquiry into the Human Mind," the partisans of Berkeley's system remained complete masters of the controversial field; and yet, during the long period which intervened, it is well known how little impression that system made on the belief of our soundest philosophers. Many answers to it were attempted, in the mean time, by various authors, both in this country and on the continent; and by one or other of these, the generality of the learned professed themselves to be convinced of its futility;—the evidence of the conclusion (as in many other cases) supporting the premises, and not the premises the conclusion.[†] A very curious anecdote, in illustration of this, is mentioned in the life of Dr. Berkeley. After the publication of his book, it appears that he had an interview with Dr. Clarke; in the course of which, Clarke (it is said) discovered a manifest unwillingness to enter into the discussion, and was accused by Berkeley of a want of candour.[‡]—The story (which if I recollect right, rests on the authority of Whiston) has every appearance of authenticity; for as Clarke, in common with his antagonist, regarded the principles of the ideal theory as incontrovertible, it was perfectly impossible for him, with all his acuteness, to detect the flaw to which Berkeley's paradox owed its plausibility. In such circumstances, would it have been unphilosophical in Clarke to have defended himself, by saying: "Your conclusion "not only contradicts those perceptions of my senses, the evidence

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[*] It was not, therefore, (as has very generally been imagined by the followers of Berkeley) from any apprehension of danger in his argument against the existence of *matter*, that Reid was induced to call in question the ideal theory: but because he thought that Mr Hume had clearly shown, by turning Berkeley's weapons against himself, that this theory was equally subversive of the existence of *mind*. The ultimate object of Berkeley and of Reid was precisely the same; the one asserting the existence of matter from the very same motive which led the other to deny it.

When I speak of Reid's *asserting the existence of matter*, I do not allude to any new proofs which he has produced of the fact. This he rests on the evidence of sense, as he rests the existence of the mind on the evidence of consciousness. All that he professes to have done is, to show the inconclusiveness of Berkeley's argument against the former, and that of Hume against the latter, by refuting the ideal hypothesis, which is the common foundation of both.

[†] The impotent, though ingenious attempt of Berkeley (not many years after the date of his metaphysical publications) to shake the foundations of the newly invented method of Fluxions, created, in the public mind, a strong prejudice against him, as a sophistical and paradoxical disputant; and operated as a more powerful antidote to the scheme of immaterialism, than all the reasonings which his contemporaries were able to oppose to it. This unfavourable impression was afterwards not a little confirmed, by the ridicule which he incurred in consequence of his pamphlet on the Virtues of Tar-water; a performance, however, of which it is but justice to add, that it contains a great deal more, both of sound philosophy and of choice learning, than could have been expected from the subject.

[‡] Philosophical Essays, Note E.

That Clarke would look upon the Berkeleian theory with more than common feelings of suspicion and alarm, may be easily conceived, when it is recollected that, by denying the independent existence both of *space* and of *time*, it put an end at once to his celebrated argument *a priori*, for the existence of God.

"of which I feel to be irresistible; but, by annihilating space itself "as an external existence, bids defiance to a conviction inseparable "from the human understanding; and, therefore, although I cannot "point out the precise oversight which has led you astray, there "*must* necessarily be some errour, either in your original *data*, or "in your subsequent reasoning." Or, supposing Clarke to have perceived, as clearly as Reid, that Berkeley's *reasoning* was perfectly unexceptionable, might he not have added;—"The conclusion "which it involves is a demonstration in the form of a *reductio ad* "*absurdum*, of the unsoundness of the ideal theory, on which the "whole of your argument is built?"*

I am far from supposing that Berkeley would have admitted this consideration as decisive of the point in dispute. On the contrary, it appears from his writings, that the scheme of immaterialism was, in his opinion, more agreeable to popular belief, than the received theories of philosophers concerning the independent existence of the external world; nay, that he considered it as one of the many advantages likely to result from the universal adoption of his system, that "men would thereby be reduced from paradoxes to *common* "*sense*."

The question, however, if not decided by this discussion, would at least have been brought to a short and simple issue; for the paramount authority of the common sense or common reason of mankind being equally recognised by both parties, all that remained for their examination was,—whether the belief of the existence, or that of the non-existence of matter, was sanctioned by this supreme tribunal? For ascertaining this point, nothing more was necessary than an accurate analysis of the meaning annexed to the word *existence*: which analysis would have at once shown, not only that we are irresistibly led to ascribe to the material world all the independent reality which this word expresses, but that it is from the material world that our first and most satisfactory notions of *existence* are drawn. The mathematical affections of matter (extension and figure) to which the constitution of the mind imperiously forces us to ascribe an existence, not only independent of our perceptions but necessary and eternal, might more particularly have been pressed upon Berkeley, as proofs how incompatible his notions were with those laws of belief, to which the learned and the unlearned must in common submit.*

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* I acknowledge, very readily, that the force of this indirect mode of reasoning is essentially different in mathematics, from what it is in the other branches of knowledge; for the object of mathematics (as will afterwards more fully appear) not being *truth*, but systematical connexion and consistency, whenever two contradictory propositions occur, embracing evidently the only possible suppositions on the point in question, if the one can be shown to be incompatible with the definitions or hypotheses on which the science is founded, this may be regarded as perfectly equivalent to a direct proof of the legitimacy of the opposite conclusion. In other sciences, the force of a *reductio ad absurdum* depends entirely on the maxim. "That truth is always consistent with itself;" a maxim which, however certain, rests evidently on grounds of a more abstract and metaphysical nature, than the indirect demonstrations of geometry. It is a maxim, at the same time, to which the most sceptical writers have not been able to refuse their testimony. "Truth (says Mr. Hume himself) *is one thing*, but errours are numberless, and every man has a different one."

The *unity* or systematical consistency of truth, is a subject which well deserves to be further prosecuted. It involves many important consequences, of which Mr. Hume does not, from the general spirit of his philosophy, seem to have been sufficiently aware.

But farther (in order to prevent any cavil about the foregoing illustration,) we shall suppose that Clarke had anticipated Hume in perceiving that the ideal theory went to the annihilation of *mind* as well as of *matter*; and that he had succeeded in proving, to the satisfaction of Berkeley, that nothing existed in the universe but impressions and ideas. Is it possible to imagine that Berkeley would not immediately have seen and acknowledged, that a theory which led to a conclusion directly contradicted by the evidence of consciousness, ought not, out of respect to ancient authority, to be rashly admitted: and that in the present instance, it was much more philosophical to argue from the conclusion against the hypothesis, than to argue from the hypothesis in proof of the conclusion? No middle course, it is evident, was left him between such an acknowledgment, and an unqualified acquiescence in those very doctrines which it was the great aim of his system to tear up by the roots.

The two chief objections which I have heard urged against this mode of defence, are not perfectly consistent with each other. The one represents it as a presumptuous and dangerous innovation in the established rules of philosophical controversy, calculated to stifle entirely a spirit of liberal inquiry; while the other charges its authors with all the meanness and guilt of literary plagiarism. I shall offer a few slight remarks upon each of these accusations.

1. That the doctrine in question is not a new one, nor even the language in which it has been recently stated an innovation in the received phraseology of logical science, has been shown by Dr. Reid, in a collection of very interesting quotations, which may be found in different parts of his Essays on the Intellectual Powers of Man, more particularly in the second chapter of the sixth essay. Nor has this doctrine been generally rejected even by those writers who, in their theories, have departed the farthest from the ordinary opinions of the world. Berkeley has sanctioned it in the most explicit manner, in a passage already quoted from his works, in which he not only attempts the extraordinary task of reconciling the scheme of immaterialism with the common sense of mankind, but alleges the very circumstance of its conformity to the unsophisticated judgment of the human race, as a strong argument in its favour, when contrasted with the paradoxical doctrine of the independent existence of matter. The ablest advocates, too, for the necessity of human actions, have held a similar language; exerting their ingenuity to show, that there is nothing in this tenet which does not perfectly accord with our internal consciousness, when our supposed feelings of liberty, with all their concomitant circumstances are accurately analyzed, and duly weighed.† In this respect,

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* See Note (B.)

† This I own, appears to me the only argument for the scheme of necessity, which deserves a moment's consideration, in the present state of the controversy: and it is cer-

Mr. Hume forms almost a solitary exception, avowing, with the greatest frankness, the complete repugnance between his philosophy and the laws of belief to which all men are subjected by the constitution of their nature. "I dine; I play a game at backgammon; I converse, and am happy with my friends; and when, after three or four hours of amusement, I would return to these speculations, they appear so cold, so strained, and so ridiculous, that I cannot find in my heart to enter into them any further. Here, then, I find myself absolutely and necessarily determined to live, and talk, and act, like other people in the common affairs of life."[*]

Even Mr. Hume himself, however, seems at times to forget his sceptical theories, and sanctions, by his own authority, not only the same logical maxims, but the same mode of expressing them, which has been so severely censured in some of his opponents.

"Those (he observes) who have refused the reality of moral distinctions, may be ranked among the disingenuous disputants. The only way of converting an antagonist of this kind, is, to leave him to himself; for, finding that nobody keeps up the controversy with him, 'tis probable he will at last, of himself, from mere weariness, come over to the side of *common sense* and reason."[†]

To the authorities which have been already produced by Reid and his successors, in vindication of that mode of arguing which is now under our review, I shall beg leave to add another, which, as far as I know, has not yet been remarked by any of them; and which, while it effectually removes from it the imputation of novelty, states, in clear and forcible terms, the grounds of that respect to which it is entitled, even in those cases where it is opposed by logical subtleties which seem to baffle all our powers of reasoning.

"What is it (said some of the ancient sophists) which constitutes what we call little, much, long, broad, small, or great? Do three grains of corn make a heap? The answer must be—No. Do four grains make a heap? You must make the same answer as before.—They continued their interrogations from one grain to another, without end; and if you should happen at last to answer, *here is a heap*, they pretended your answer was absurd, in as much as it supposed, that one single grain makes the difference between what is a heap, and what is not. I might prove, by the same method, that a great drinker is never drunk. Will one drop of wine fuddle him?—No. Two drops, then? By no means; neither three nor four. I might thus continue my interrogations from one drop to another; and if, at the end of the 999th drop, you an-

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tainly possible to state it in such a form as to give it some degree of plausibility to a superficial inquirer. On this point, however, as on many others, our *first* and *third* thoughts will be found perfectly to coincide; a more careful and profound examination of the question infallibly bringing back to their natural impressions, those who reflect on the subject with candour and with due attention. Having alluded to so very important a controversy, I could not help throwing out this hint here. The farther prosecution of it would be altogether foreign to my present purpose.

[*] Treatise of Human Nature, Vol. I. p. 467.

[†] Inquiry concerning the Principles of Morals.

swered, he is not fuddled, and at the 1000th he is, I should be entitled to infer, that one single drop of wine makes the difference between being drunk and being sober; which is absurd. If the interrogations went on from bottle to bottle, you could easily mark the difference in question. But he who attacks you with a *sorites*, is at liberty to choose his own weapons; and, by making use of the smallest conceivable increments, renders it impossible for you to name a precise point which fixes a sensible limit between being drunk and being sober; between what is little and what is great; between what is enough and what is too much. A man of the world would laugh at these sophistical quibbles, and would *appeal to common sense*; to that degree of knowledge which, in common life, is sufficient to enable us to establish such distinctions. But to this tribunal a professed dialectician was not permitted to resort; he was obliged to answer in form; and if unable to find a solution according to the rules of art, his defeat was unavoidable. Even at this day, an Irish tutor,* who should harass a professor of Salamanca with similar subtleties, and should receive no other answer but this,—*common sense, and the general consent of mankind, sufficiently show that your inferences are false*,—would gain the victory; his antagonist having declined to defend himself with those logical weapons with which the assault had been made."

Had the foregoing passage been read to the late Dr. Priestley, while he was employed in combating the writings of Reid, Oswald, and Beattie, he would, I apprehend, without hesitation, have supposed it to be the production of one of their disciples. The fact is, it is a translation from Mr. Bayle, an author who was never accused of an undue deference for established opinions, and who was himself undoubtedly one of the most subtile disputants of modern times.†

From this quotation it clearly appears, not only that the *substance* of the doctrine maintained by these philosophers is of a much earlier date than their writings; but that, in adopting the phrase *common sense*, to express that standard or criterion of truth to which they appealed, they did not depart from the language previously in use among the least dogmatical of their predecessors.

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* It is remarkable of this ingenious, eloquent, and gallant nation, that it has been for ages distinguished, in the universities on the continent, for its proficiency in the school logic. *Le Sage* (who seems to have had a very just idea of the value of this accomplishment) alludes to this feature in the Irish character, in the account given by Gil Blas of his studies at Oviedo. *Je m'appliquai aussi à la logique, qui m'apprit à raisonner beaucoup. J'aimois tant la dispute, que j'arrêtois les passans, connus ou inconnus, pour leur proposer des argumens. Je m'addressois quelquefois à des figures Hibernoises, qui ne demandoient pas mieux, et il falloit alors nous voir disputer. Quels gestes, quelles grimaces, quelles contorsions! nos yeux etoient pleins de fureur, et nos bouches ecumantes. On nous devoit plutot prendre pour des possédés que pour des philosophes."‡

† See Bayle's Dictionary, article *Chrysippe*. I have availed myself, in the above translation (with a few retrenchments and corrections,) of that which is given in the English Biographical and Critical Dictionary.

‡ [I applied myself also to Logic, and began to argue apace. I was so much in love with dispute, that I stopped passengers, known or unknown, and proposed arguments to them; and sometimes meeting with *Hibernian geniuses*, who were very glad of the occasion, it was a good jest to see us dispute. By our extravagant gestures, grimace, contortions, our eyes full of fury, and our mouths full of foam, you would have taken us for Bedlamites rather than philosophers.]

In the passage just quoted from Bayle, that passion for disputation which, in modern Europe, has so often subjected the plainest truths to the tribunal of metaphysical discussion, is, with great justness, traced to the unlimited influence which the school logic maintained for so many ages over the understandings of the learned. And although, since the period when Bayle wrote, this influence has every where most remarkably declined, it has yet left traces behind it, in the habits of thinking and judging, prevalent among speculative men, which are but too discernible in all the branches of science connected with the philosophy of the mind. In illustration of this remark, it would be easy to produce a copious list of examples from the literary history of the eighteenth century; but the farther prosecution of the subject here would lead me aside from the conclusions which I have at present in view. I shall therefore content myself with opposing, to the contentious and sceptical spirit bequeathed by the schoolmen to their successors, the following wise and cautious maxims of their master,—maxims which, while they illustrate his anxiety to guard the principles of the demonstrative sciences against the captiousness of sophists, evince the respect which he conceived to be due by the philosopher to the universal reason of the human race.

"Those things are to be regarded as *first truths*, the credit of "which is not derived from other truths, but is inherent in them"selves. As for *probable* truths, they are such as are admitted by "*all* men, or by the *generality* of men, or by *wise* men; and, among "these last, either by all the wise, or by the generality of the wise, "or by such of the wise as are of the highest authority."*

The argument from universal consent, on which so much stress is laid by many of the ancients, is the same doctrine with the foregoing, under a form somewhat different. It is stated with great simplicity and force by a Platonic philosopher, in the following sentences:

"In such a contest, and tumult, and disagreement, (about other "matters of opinion) you may see this one law and language ac"knowledged by common accord.—This the Greek says, and this "the barbarian says; and the inhabitant of the continent, and the "islander; and the wise, and the unwise."†

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* Εστι δε αληθη μεν και πρωτα, τα μη δι' ἑτερων, αλλα δι' ἀυτων εχοντα την πιστιν. Ενδοξα δε, τα δοκουντα πασιν, η τοις πλειστοις, η τοις σοφοις και τουτοις, η τοις πασιν, η τοις πλειστοις, τοις μαλιστα γνωριμοις, και ενδοξοις.—*Aristot. Top.* Lib. 1. cap. 1. (Vol. I. p. 180, ed. Du. Val.)

† Εν τοσουτῳ δε πολεμῳ και στασει και διαφωνια ἑνα ιδοις αν εν παση γη ὁμοφωνον νομον και λογον, &c. Ταυτα δε ο Ελλην λεγει, και ὁ Βαρβαρος λεγει, και ὁ ηπειρωτης και ὁ θαλαττιος, και ὁ σοφος, και ὁ ασοφος.—*Max. Tyr.* (speaking of the existence of the Deity) Dis. 1.

"Una in re consensio omnium gentium lex naturae putanda est.—*Cic.* 1. Tusc.‡

"Multum dare solemus praesumptioni omnium hominum: Apud nos veritatis argumentum est, aliquid omnibus videri," &c. &c.—Sen. Ep. 117.§

‡ [The consent of all nations must be esteemed the law of nature.]

§ [*We are disposed to pay much respect to the general opinions of mankind; and allow that universal agreement is a good argument of truth.*]

nnot be denied, that against this summary species of logic,
mployed without any collateral lights, as an infallible touch-
f philosophical truth, a strong objection immediately occurs.
t test (it may be asked) is a principle of common sense to
guished from one of those prejudices to which the whole
race are irresistibly led, in the first instance, by the very con-
of their nature? If no test or criterion of truth can be
out but universal consent, may not all those errors which Ba-
called *idola tribus*, claim a right to admission among the in-
ertible axioms of science? And might not the popular cavils
the supposition of the earth's motion, which so long obstruct-
progress of the Copernican system, have been legitimately
d, as a reply of paramount authority, to all the scientific rea-
by which it was supported?

much to be wished that this objection, of which Dr. Reid
t fail to be fully aware, had been more particularly examin-
discussed in some of his publications, than he seems to have
necessary. From different parts of his works, however,
important hints towards a satisfactory answer to it might be
ollected.* At present, I shall only remark, that although
lity *of belief* is one of the tests by which (according to him)
ple of common sense is characterized, it is not the only test
e represents as essential. Long before his time, Father Buf-
his excellent treatise on First Truths, had laid great stress
other circumstances, as *criteria* to be attended to on such oc-
and although I do not recollect any passage in Reid where
so explicitly stated, yet the general spirit of his reasonings
shows, that he had them constantly in view in all the practi-
ications of his doctrine. The *first* criterion mentioned by
is, "That the truths assumed as maxims of common sense
d be such, that it is impossible for any disputant either to de-
r to attack them, but by means of propositions which are
er more manifest nor more certain than the propositions in
on." The *second* criterion is, "That their practical influ-
should extend even to those individuals who affect to dis-
their authority."

ese remarks of Buffier it may not be altogether superfluous
that, wherever a prejudice is found to obtain universally
mankind in any stage of society, this prejudice must have
ndation in the general principles of our nature, and must
l upon some *truth* or fact inaccurately apprehended, or erro-
applied. The suspense of judgment, therefore, which is
with respect to particular opinions, till they be once fairly
d, can never justify scepticism with respect to the general
the human mind. Our belief of the sun's motion is not a
on to which we are necessarily led by any such law, but an
e rashly drawn from the perceptions of sense, which do not

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particular, Essays on the Int. Powers, p. 565, et seq. 4to. edition.

warrant such an inference. All that we see is, that a relative change of position between us and the sun takes place, and this fact, which is made known to us by our senses, no subsequent discovery of philosophy pretends to disprove. It is not, therefore, the evidence of perception which is overturned by the Copernican system, but a *judgment* or inference of the understanding, of the rashness of which every person must be fully sensible, the moment he is made to reflect with due attention on the circumstances of the case; and the doctrine which this system substitutes instead of our first crude apprehensions on the subject, is founded, not on any process of reasoning *a priori*, but on the demonstrable inconsistency of these apprehensions with the various phenomena which our perceptions present to us. Had Copernicus not only asserted the stability of the Sun, but, with some of the sophists of old, denied that any such thing as *motion* exists in the universe, his theory would have been precisely analogous to that of the non-existence of matter; and no answer to it could have been thought of more pertinent and philosophical, than that which Plato is said to have given to the same paradox in the mouth of Zeno, by rising up and walking before his eyes.

2. If the foregoing observations be just, they not only illustrate the coincidence between Dr. Reid's general argument against those metaphysical paradoxes which revolt common sense, and the maxims of philosophical discussion previously sanctioned by our soundest reasoners; but they go far, at the same time, to refute that charge of plagiarism in which he has been involved, in common with two other Scottish writers, who have made their stand in opposition to Berkeley and Hume, nearly on the same ground. This charge has been stated in all its force, in the preface to an English translation of Buffier's Premières Vérités, printed at London in the year 1780; and it cannot be denied, that some of the proofs alleged in its support are not without plausibility. But why suppose Reid to have borrowed from this learned jesuit, a mode of arguing which has been familiar to men in all ages of the world; and to which, long before the publication of Buffier's excellent book, the very same phraseology had been applied by numberless other authors. On this point, the passage already quoted from Bayle is of itself decisive. The truth is, it is a mode of arguing likely to occur to every sincere and enlightened inquirer, when bewildered by sceptical sophistry; and which, during the long interval between the publication of the Berkeleian theory, and that of Reid's Inquiry, was the only tenable post on which the conclusions of the former could be combated. After the length to which the logical consequences of the same principles were subsequently pushed in the *Treatise of Human Nature*, this must have appeared completely manifest to all who were aware of the irresistible force of the argument, as it is there stated; and, in fact, this very ground was taken as early as the year 1751, in a private correspondence with Mr. Hume, by an intimate friend of his own, for whose judgment, both on philosophical and literary subjects,

s to have felt a peculiar deference.* I mention this, as a
at the doctrine in question was the natural result of the
science at the period when Reid appeared; and, conse-
that no argument against his originality in adopting it, can
ly be founded on its coincidence with the views of any pre-
thor.

more satisfactory reply to the charge of plagiarism may be
from this consideration, that, in Buffier's Treatise, the doc-
ich has furnished the chief ground of accusation is stated
greater precision and distinctness than in Dr. Reid's *first*
on the Human Mind; and that, in his subsequent perfor-
after he had perused the writings of Buffier, his phraseolo-
e considerably more guarded and consistent than before.

observation be admitted in the case of Dr. Reid, it will be
apply with still greater force to Dr. Beattie, whose lan-
various parts of his book, is so loose and unsettled, as to
monstrative proof that it was not from Buffier he derived
of his general argument. In confirmation of this, I shall
tion the first chapter of the first part of his Essay, in which
pts to draw the line between common sense and reason;
confounding (as many other authors of high reputation
e) the two very different words, *reason* and *reasoning*. His
f common sense, in the following passage, is liable to cen-
lmost every line: "The term *common sense* hath, in mo-
mes, been used by philosophers, both French and British, to
that power of the mind which perceives truth, or com-
belief, not by progressive argumentation, but by an instan-
, instinctive, and irresistible impulse; derived neither from
ion nor from habit, but from nature; acting independently
will, whenever its object is presented, according to an es-
d law, and *therefore properly called* SENSE,† and acting in a

te (C.)

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ctrine of the schoolmen (revived in later times under a form somewhat modi-
ke,) which refers to *sensation* the origin of all our ideas, has given rise to a ve-
stable extension of the word *sense*, in the writings of modern philosophers.
s first asserted, that "there is nothing in the intellect which does not come to
he medium of sense," there cannot be a doubt that, by this last term, were
exclusively our powers of *external* perception. In process of time, however,
s discovered, that there are many ideas which cannot possibly be traced to
and which, of consequence, afford undeniable proof that the scholastic ac-
origin of our ideas is extremely imperfect. Such was certainly the logical
which these discoveries should have led; but, instead of adopting it, philoso-
from the first, shown a disposition to save, as much as possible, the credit of
s in which they had been educated, by giving to the word *sense* so great a la-
ning, as to comprehend all the various sources of our simple ideas, whatever
s may be. "All the *ideas* (says Dr. Hutcheson) or the materials of our rea-
udging, are received by some immediate powers of perception, internal or ex-
h we may call *senses*. Under the title of *internal senses*, accordingly, many
ticularly of the medical profession, continue to this day to comprehend memo-
nation, and other faculties, both intellectual and active.—(Vid. *Haller*, *Ele-
iologiæ*, Lib. xvii.) Hence also the phrases *moral sense*, *the senses of beauty
g*, and many of the other peculiarities of Dr. Hutcheson's language: a mode
which was afterwards carried to a much more blameable excess by Lord

“similar manner upon all, or at least upon a great majority of mankind, and therefore properly called COMMON SENSE.”*

“Reason,” on the other hand, (we are told by the same author) “is used by those who are most accurate in distinguishing, to signify that power of the human mind by which we draw inferences, or by which we are convinced that a relation belongs to two ideas, on account of our having found that these ideas bear certain relations to other ideas. In a word, it is that faculty which enables us, from relations or ideas that are known, to investigate such as are unknown; and without which we never could proceed in the discovery of truth a single step beyond first principles or intuitive axioms.”† “It is in this last sense (he adds) that we are to use the word *reason* in the course of this inquiry.”

These two passages are severely, and, I think, justly animadverted on, in the preface to the English translation of Buffier's book, where they are contrasted with the definition of *common sense* given by that profound and original philosopher. From this definition it appears, that, far from opposing common sense and reason to each other, he considers them either as the same faculty, or as faculties necessarily and inseparably connected together. “It is a faculty (he says) which appears in all men, or at least in the far greater number of them, when they have arrived at the age of reason, enabling them to form a common and uniform judgment, on subjects essentially connected with the ordinary concerns of life.”

That this contrast turns out greatly to the advantage of Buffier,‡ must, I think, be granted to his very acute and intelligent translator.

Kaimes. Dr. Beattie, in the passage quoted above, has indirectly given his sanction to the same abuse of words; plainly supposing the phrase, *common sense*, not only to mean something quite distinct from reason, but something which bears so close an analogy to the powers of external sense, as to be not improperly called by the same name.

* Essay on Truth, p. 40. 2d edit.

† Essay on Truth, pp. 36, 37, 2d edit.

‡ It is remarkable how little attention the writings of Buffier have attracted in his own country, and how very inadequate to his real eminence has been the rank commonly assigned to him among French philosophers. This has perhaps been partly owing to an unfortunate combination which he thought proper to make of a variety of miscellaneous treatises, of very unequal merit, into a large work, to which he gave the name of *A Course of the Sciences.* Some of these treatises, however, are of great value: particularly that on *First Truths,* which contains (along with some erroneous notions, easily to be accounted for by the period when the author wrote, and the religious society with which he was connected,) many original and important views concerning the foundations of human knowledge, and the first principles of a rational logic. Voltaire, in his catalogue of the illustrious writers who adorned the reign of Louis XIV. is one of the very few French authors who have spoken of Buffier with due respect.” “Il y a dans ses traités de métaphysique des morceaux que Locke n'aurait pas désavoués, et c'est le seul jésuite qui ait mis une philosophie raisonnable dans ses ouvrages.”‖ Another French philosopher, too, of a very different school, and certainly not disposed to overrate the talents of Buffier, has, in a work published as lately as 1805, candidly acknowledged the lights which he might have derived from the labours of his predecessor, if he had been acquainted with them at an earlier period of his studies. Condillac, he also observes, might have profited greatly by

‖ [We find in his metaphysical tracts, passages which Locke would not have disowned; and he is the only jesuit who has taught a rational philosophy.]

But while I make this concession in favour of his statement, I must be allowed to add, that, in the same proportion in which Dr. Beattie falls short of the clearness and logical accuracy of his predecessor, he ought to stand acquitted, in the opinion of all men of candour, of every suspicion of a dishonourable plagiarism from his writings.

It is the doctrine itself, however, and not the comparative merits of its various abettors, that is likely to interest the generality of philosophical students; and as I have always thought that this has suffered considerably in the public estimation, in consequence of the statement of it given in the passage just quoted from the Essay on Truth, I shall avail myself of the present opportunity to remark, how widely that statement differs from the language, not only of Buffier, but of the author's contemporary and friend, Dr. Reid. This circumstance I think it necessary to mention, as it seems to have been through the medium of Dr. Beattie's Essay, that most English writers have derived their imperfect information concerning Reid's philosophy.

"There is a certain degree of *sense* (says this last author, in his "Essays on the Intellectual Powers of Man,) which is necessary to "our being subjects of law and government, capable of managing "our own affairs, and answerable for our conduct to others. This "is called *common sense*, because it is common to all men with whom "we can transact business."

"The same degree of understanding (he afterwards observes) "which makes a man capable of acting with common prudence "in life, makes him capable of discerning what is true and what "is false, in matters that are self-evident, and which he distinctly "apprehends." In a subsequent paragraph, he gives his sanction to a passage from Dr. Bentley, in which *common sense* is expressly used as synonymous with *natural light and reason.*[*]

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the same lights, if he had availed himself of their guidance in his inquiries concerning the human understanding. "Du moins est il certain, que pour ma part, je suis fort fâché de ne connoître que depuis très peu de temps ces opinions du Père Buffier; si je les avais vues plutôt énoncées quelque part, elles m'auraient épargné beaucoup de peines et d'hésitations."——"Je regrette beaucoup que Condillac, dans ses profondes et sagaces méditations sur l'intelligence humaine, n'ait pas fait plus d'attention aux idées du Père Buffier,"[†] &c. &c.—*Elémens d'Idéologie, par M. Destutt-Tracy*, Tom. III. pp. 136, 137.

[*] Pages 522. 524, 4to edit. In the following verses of Prior, the word *reason* is employed in an acceptation exactly coincident with the idea which is, *on most occasions*, annexed by Dr. Reid to the phrase *common sense:*

"Note here, Lucretius dares to teach
(As all our youth may learn from *Creech*,)
That eyes were made, but could not view,
Nor hands embrace, nor feet pursue,
But heedless Nature did produce
The members first, and then the use;

[†] [At least for my part I am very sorry not to have become acquainted, until within a very short time, with these opinions of Father Buffier; had I sooner seen them, they would have saved me much doubt and hesitation.——I greatly regret that Condillac, in his profound and sagacious meditations on the human understanding, has not paid more attention to the ideas of Father Buffier.]

It is to be regretted, as a circumstance unfavourable to the reception of Dr. Beattie's valuable essay among accurate reasoners, that, in the outset of his discussions, he did not confine himself to some such general explanation of this phrase as is given in the foregoing extracts from Buffier and Reid, without affecting a tone of logical precision in his definitions and distinctions, which, so far from being necessary to his intended argument, were evidently out of place, in a work designed as a popular antidote against the illusions of metaphysical scepticism. The very idea, indeed, of appealing to *common sense*, virtually implies that these words are to be understood in their ordinary acceptation, unrestricted and unmodified by any technical refinements and comments. This part of his essay, accordingly, which is by far the most vulnerable part of it, has been attacked with advantage, not only by the translator of Buffier, but by Sir James Steuart, in a very acute letter published in the last edition of his works.*

While I thus endeavour, however, to distinguish Dr. Reid's definition of *common sense* from that of Dr. Beattie, I am far from considering even the language of the former on this subject, as in every instance unexceptionable; nor do I think it has been a fortunate circumstance (notwithstanding the very high authorities which may be quoted in his vindication,) that he attempted to incorporate so vague and ambiguous a phrase with the appropriate terms of logic. My chief reasons for this opinion I have stated at some length, in an account published a few years ago of Dr. Reid's Life and Writings.†

What each must act was yet unknown,
Till all was moved by Chance alone.
. . . .
. . . .
Blest for his sake be *human reason*,
Which came at last though late, in season."—*Alma*, *Canto I.*

* To the honour of Dr. Beattie it must be remarked, that his reply to this letter (which may be found in Sir James Steuart's works) is written in a strain of forbearance and of good humour, which few authors would have been able to maintain, after being handled so roughly.

† In consequence of the ambiguous meaning of this phrase, Dr. Reid sometimes falls into a sort of play on words, which I have often regretted. "If this be philosophy (says he, on one occasion) I renounce her guidance. Let my soul dwell with common sense." (*Inquiry into the Human Mind*, chap. i. sect. 3. See also sect. 4 of the same chapter.) And in another passage, after quoting the noted saying of Hobbes, that "when reason is against a man, a man will be against reason;" he adds: "This is equally applicable to *common sense*." (*Essays on the Intellectual Powers*, p. 530, 4to. edition.) In both of these instances, and indeed in the general strain of argument which runs through his works, he understands *common sense* in its ordinary acceptation, as synonymous, or very nearly synonymous, with the word *reason*, as it is now most frequently employed. In a few cases, however, he seems to have annexed to the same phrase a technical meaning of his own, and has even spoken of this meaning as a thing not generally understood. Thus, after illustrating the different classes of *natural signs*, he adds the following sentence: "It may be observed, that as the first class of natural signs I have mentioned is the foundation of true philosophy, and the second of the fine arts or of taste, so the last is the foundation of *common sense; a part of human nature which hath never been explained*."—*Inquiry*, chap. v. sect. 3.

See Note (D.)

One very unlucky consequence has unquestionably resulted from e coincidence of so many writers connected with this northern t of the island, in adopting, about the same period, the same ase, as a sort of philosophical watch-word;—that, although their differ widely in various respects, they have in general been ed together as partisans of a new sect, and as mutually respon- le for the doctrines of each other. It is easy to perceive the use ly to be made of this accident by an uncandid antagonist.

All of these writers have, in my opinion, been occasionally misled their speculations, by a want of attention to the distinction between st principles, properly so called, and the fundamental laws of human belief. Buffier himself has fallen into the same errour; nor do know of any one logician, from the time of Aristotle downwards, ho has entirely avoided it.

The foregoing critical remarks will, I hope, have their use in eeping this distinction more steadily in the view of future inquirers; and in preventing some of the readers of the publications to hich they relate, from conceiving a prejudice, in consequence of e looseness of that phraseology which has been accidentally adopted by their authors, against the just and important conclusions which ey contain.

CHAPTER SECOND.

OF REASONING AND OF DEDUCTIVE EVIDENCE.

SECTION I.

ubts with respect to Locke's Distinction between the Powers of Intuition and of Reasoning.

ALTHOUGH, in treating of this branch of the Philosophy of the Mind, have followed the example of preceding writers, so far as to speak f intuition and reasoning as two different faculties of the understanding, I am by no means satisfied that there exists between them that dical distinction which is commonly apprehended. Dr. Beattie, in s Essay on Truth, has attempted to show, that, how closely soever ey may in general be connected, yet that this connexion is not necessary; in so much, that a being may be conceived endued with e one, and at the same time destitute of the other.* Something

* Beattie's Essay, p. 41. 2d edit.

of this kind, he remarks, takes place in dreams and in madness; in both of which states of the system, the power of reasoning appears occasionally to be retained in no inconsiderable degree, while the power of intuition is suspended or lost. But this doctrine is liable to obvious, and to insurmountable objections; and has plainly taken its rise from the vagueness of the phrase *common sense*, which the author employs through the whole of his argument, as synonymous with the power of *intuition*. Of the indissoluble connexion between this last power and that of reasoning, no other proof is necessary than the following consideration, that, "in every step which reason "makes in demonstrative knowledge, there must be intuitive cer"tainty;" a proposition which Locke has excellently illustrated, and which, since his time, has been acquiesced in, so far as I know, by philosophers of all descriptions. From this proposition (which, when properly interpreted, appears to me to be perfectly just) it obviously follows, that the power of reasoning presupposes the power of intuition; and, therefore, the only question about which any doubt can be entertained is, Whether the power of intuition (according to Locke's idea of it) does not also imply that of reasoning? My own opinion is, decidedly, that it does; at least, when combined with the faculty of memory. In examining those processes of thought which conduct the mind by a series of consequences from premises to a conclusion, I can detect no intellectual act whatever, which the joint operation of intuition and of memory does not sufficiently explain.

Before, however, proceeding farther in this discussion, it is proper for me to observe, by way of comment on the proposition just quoted from Locke, that, although, "in a complete demonstration, "there must be intuitive evidence at every step," it is not to be supposed, that, in every demonstration, all the various intuitive judgments leading to the conclusion are actually presented to our thoughts. In by far the greater number of instances, we trust entirely to judgments resting upon the evidence of memory; by the help of which faculty, we are enabled to connect together the most remote truths, with the very same confidence as if the one were an immediate consequence of the other. Nor does this diminish, in the smallest degree, the satisfaction we feel in following such a train of reasoning. On the contrary, nothing can be more disgusting than a demonstration where even the simplest and most obvious steps are brought forward to view; and where no appeal is made to that stock of previous knowledge which memory has identified with the operations of reason. Still, however, it is true, that it is by a continued chain of intuitive judgments, that the whole science of geometry hangs together; in as much as the demonstration of any one proposition virtually includes all the previous demonstrations to which it refers.

Hence it appears, that, in mathematical demonstrations, we have not, at every step, the *immediate* evidence of intuition, but only the evidence of memory. Every demonstration, however, may be reolved into a series of separate judgments, either formed at the moment, or remembered as the results of judgments formed at some preceding period; and it is in the arrangement and concatenation of these different judgments, or *media* of proof, that the inventive and reasoning powers of the mathematician find so noble a field for their exercise.

With respect to these powers of judgment and of reasoning, as they are here combined, it appears to me, that the results of the former may be compared to a collection of separate stones prepared by the chisel for the purposes of the builder; upon each of which stones, while lying on the ground, a person may raise himself, as upon a pedestal, to a small elevation. The same judgments, when combined into a train of reasoning, terminating in a remote conclusion, resemble the formerly unconnected blocks, when converted into the steps of a staircase leading to the summit of a tower, which would be otherwise inaccessible. In the design and execution of this staircase, much skill and invention may be displayed by the architect; but, in order to ascend it, nothing more is necessary than a repetition of the act by which the first step was gained. The fact I conceive to be somewhat analogous, in the relation between the power of judgment, and what logicians call the discursive processes of the understanding.

Mr. Locke's language, in various parts of his Essay, seems to accord with the same opinion. "Every step in reasoning, (he observes) that produces knowledge, has intuitive certainty; *which, when the mind perceives, there is no more required but to remember it,* to make the agreement or disagreement of the ideas, concerning which we inquire, visible and certain. This intuitive perception of the agreement or disagreement of the intermediate ideas, in each step and progression of the demonstration, must also be carried exactly in the mind, and a man must be sure that no part is left out; which, in long deductions, and in the use of many proofs, the memory does not always so readily and exactly retain: therefore it comes to pass, that this is more imperfect than intuitive knowledge, and men embrace often falsehood for demonstrations."*

The same doctrine is stated elsewhere by Mr. Locke, more than once, in terms equally explicit;† and yet his language occasionally favours the supposition, that, in its deductive processes, the mind exhibits some modification of reason essentially distinct from intuition. The account, too, which he has given of their respective provinces, affords evidence that his notions concerning them were not sufficiently precise and settled. "When the mind (says he) perceives the agreement or disagreement of two ideas immediately by themselves, without the intervention of any other, its knowledge may be called intuitive. When it cannot so bring its ideas

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* B. IV. chap. ii. § 7. See also B. IV. chap. xvii. § 15.

† B. IV. chap. xvii. § 2. B. IV. chap. xvii. § 4. § 14.

"together as, by their immediate comparison, and, as it were, juxtaposition, or application one to another, to perceive their agreement or disagreement, it is fain, by the intervention of other ideas, (one or more as it happens) to discover the agreement or disagreement which it searches; and this is that which we call *reasoning*."[*] According to these definitions, supposing the equality of two lines A and B to be perceived immediately in consequence of their coincidence; the judgment of the mind is intuitive: supposing A to coincide with B, and B with C; the relation between A and C is perceived by reasoning. Nor is this a hasty inference from Locke's accidental language. That it is perfectly agreeable to the foregoing definitions, as understood by their author, appears from the following passage, which occurs afterwards: "The principal act of *ratiocination* is the finding the agreement or disagreement of two ideas, one with another, by the intervention of a third. As a man, by a yard, finds two houses to be of the same length, which could not be brought together to measure their equality by juxta-position."[†]

This use of the words *intuition* and *reasoning*, is surely somewhat arbitrary. The truth of mathematical axioms has always been supposed to be intuitively obvious; and the first of these, according to Euclid's enumeration, affirms, That if A be equal to B, and B to C, A and C are equal. Admitting, however, Locke's definition to be just, it only tends to confirm what has been already stated with respect to the near affinity, or rather the radical identity of intuition and of reasoning. When the relation of equality between A and B has once been perceived, A and B are completely identified as the same mathematical quantity; and the two letters may be regarded as synonymous wherever they occur. The faculty, therefore, which perceives the relation between A and C, is the same with the faculty which perceives the relation between A and B, and between B and C.[‡]

In farther confirmation of the same proposition, an appeal might be made to the structure of syllogisms. Is it possible to conceive an understanding so formed as to perceive the truth of the major and of the minor propositions, and yet not to perceive the force of the conclusion? The contrary must appear evident to every person who knows what a syllogism is; or rather, as in this mode of stating an argument, the mind is led from universals to particulars, it must appear evident, that, in the very statement of the major proposition, the truth of the conclusion is presupposed; in so much, that it was not without good reason Dr. Campbell hazarded the epigrammatic, yet unanswerable remark, that "there is always some "radical defect in a syllogism, which is not chargeable with that "species of sophism known among logicians by the name of *petitio* "*principii*, or a *begging of the question*."*

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[*] B. IV. chap. ii. §§ 1. and 2.

[†] B. IV. chap. xvii. § 18.

[‡] Dr. Reid's notions, as well as those of Mr. Locke, seem to have been somewhat unsettled with respect to the precise line which separates intuition from reasoning. That the axioms of geometry are intuitive truths, he has remarked in numberless passages of his works; and yet, in speaking of the application of the syllogistic theory to mathematics, he makes use of the following expression: "The simple *reasoning*, 'A is equal to B, and B to C, therefore A is equal to C,' cannot be brought into any syllogism in figure and mode."—See his *Analysis of Aristotle's Logic.*

The idea which is commonly annexed to *intuition*, as opposed to *reasoning*, turns, I suspect, entirely on the circumstance of *time*. The former we conceive to be instantaneous; whereas the latter necessarily involves the notion of succession, or of progress. This distinction is sufficiently precise for the ordinary purposes of discourse; nay, it supplies us, on many occasions, with a convenient phraseology: but, in the theory of the mind, it has led to some mistaken conclusions, on which I intend to offer a few remarks in the second part of this section.

So much with respect to the separate provinces of these powers, according to Locke; a point on which I am, after all, inclined to think, that my own opinion does not differ essentially from his, whatever inferences to the contrary may be drawn from some of his casual expressions. The misapprehensions into which these have contributed to lead various writers of a later date, will, I hope, furnish a sufficient apology for the attempt which I have made, to place the question in a stronger light than he seems to have thought requisite for its illustration.

In some of the foregoing quotations from his Essay, there is another fault of still greater moment; of which, although not immediately connected with the topic now under discussion, it is proper for me to take notice, that I may not have the appearance of acquiescing in a mode of speaking so extremely exceptionable. What I allude to is, the supposition which his language, concerning the powers both of intuition and of reasoning, involves, *that knowledge consists solely in the perception of the agreement or the disagreement of our ideas*. The impropriety of this phraseology has been sufficiently exposed by Dr. Reid, whose animadversions I would beg leave to recommend to the attention of those readers, who, from long habit, may have familiarized their ear to the peculiarities of Locke's philosophical diction. In this place I think it sufficient for me to add to Dr. Reid's strictures, that Mr. Locke's language has, in the present instance, been suggested to him by the partial view which he took of the subject; his illustrations being chiefly borrowed from mathematics, and the relations about which it is conversant. When applied to these relations, it is undoubtedly possible to annex some sense to such phrases as *comparing ideas*,—*the juxta-position of ideas*,—*the perception of the agreements or disagreements of ideas*; but, in most other branches of knowledge, this jargon will be found, on examination, to be altogether unmeaning; and, instead of adding to the precision of our notions, to involve plain facts in technical and scholastic mystery.

This last observation leads me to remark farther, that even, when Locke speaks of reasoning in general, he seems in many cases, to have had a tacit reference, in his own mind, to mathematical demonstration; and the same criticism may be extended to every logical writer whom I know, not excepting Aristotle himself. Perhaps it is chiefly owing to this, that their discussions are so often of very little practical utility; the rules which result from them being wholly superfluous, when applied to mathematics; and, when extended to other branches of knowledge, being unsusceptible of any precise, or even intelligible interpretation.

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* Phil. of Rhet. Vol. I. p. 174. [Boston edit. p. 93.]

SECTION I.

II.

Conclusions obtained by a Process of Deduction often mistaken for Intuitive Judgments.

It has been frequently remarked, that the justest and most efficient understandings are often possessed by men who are incapable of stating to others, or even to themselves, the grounds on which they proceed in forming their decisions. In some instances, I have been disposed to ascribe this to the faults of early education; but, in other cases, I am persuaded, that it was the effect of active and imperious habits in quickening the evanescent processes of thought, so as to render them untraceable by the memory; and to give the appearance of *intuition* to what was in fact the result of a train of reasoning so rapid as to escape notice. This I conceive to be the true theory of what is generally called *common sense*, in opposition to book-learning; and it serves to account for the use which has been made of this phrase, by various writers, as synonymous with intuition.

These seemingly instantaneous judgments have always appeared to me as entitled to a greater share of our confidence than many of our more deliberate conclusions; in as much as they have been *forced*, as it were, on the mind by the lessons of long experience; and are as little liable to be biassed by temper or passion, as the estimates we form of the distances of visible objects. They constitute, indeed, to those who are habitually engaged in the busy scenes of life, a sort of peculiar *faculty*, analogous, both in its origin and in its use, to the *coup d'oeil* of the military engineer, or to the quick and sure tact of the medical practitioner, in marking the diagnostics of disease.

For this reason, I look upon the distinction between our intuitive and deductive judgments as, in many cases, merely an object of theoretical curiosity. In those simple conclusions which all men are impelled to form by the necessities of their nature, and in which we find an uniformity not less constant than in the acquired perceptions of sight, it is of as little consequence to the logician to spend his time in efforts to retrace the first steps of the infant understanding, as it would be to the sailor or the sportsman to study, with a view to the improvement of his eye, the Berkeleian theory of vi-ion. In both instances, the original faculty and the acquired judgment are equally entitled to be considered as the work of Nature; and in both instances we find it equally impossible to shake off her authority. It is no wonder therefore, that, in popular language, such words as *common sense* and *reason* should be used with a considerable degree of latitude; nor is it of much importance to the philosopher to aim at extreme nicety in defining their province, where all mankind, whether wise or ignorant, think and speak alike.

In some rare and anomalous cases, a rapidity of judgment in the more complicated concerns of life, appears in individuals who have had so few opportunities of profiting by experience, that it seems, on a superficial view, to be the immediate gift of heaven. But, in all such instances (although a great deal must undoubtedly be ascribed to an inexplicable aptitude or predisposition of the intellectual powers,) we may be perfectly assured, that every judgment of the understanding is preceded by a process of reasoning or deduction, whether the individual himself be able to recollect it or not. Of this I can no more doubt, than I could bring myself to believe that the Arithmetical Prodigy, who has, of late, so justly attracted the attention of the curious, is able to extract square and cube roots by an instinctive and instantaneous perception, because the process of mental calculation, by which he is led to the result, eludes all his efforts to recover it.*

It is remarked by Mr. Hume, with respect to the elocution of Oliver Cromwell, that "it was always confused, embarrassed, and "unintelligible."—"The great defect, however, (he adds) in Oli-"ver's speeches, consisted, not in his want of elocution, but in his "want of ideas; the sagacity of his actions, and the absurdity of "his discourse, forming the most prodigious contrast that ever was "known."—"In the great variety of human geniuses (says the "same historian, upon a different occasion) there are some which, "though they see their object clearly and distinctly in general; "yet, when they come to unfold its parts by discourse or writing, "lose that luminous conception which they had before attained. "All accounts agree in ascribing to Cromwell, a tiresome, dark, "unintelligible elocution, even when he had no intention to dis-"guise his meaning: Yet, no man's actions were ever, in such a "variety of difficult incidents, more decisive and judicious."

The case here described may be considered as an *extreme* one; but every person of common observation must recollect facts somewhat analogous, which have fallen under his own notice. Indeed, it is no more than we should expect *a priori*, to meet with, in every individual whose early habits have trained him more to the active business of the world, than to those pursuits, which prepare the mind for communicating to others its ideas and feelings with clearness and effect.

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* See Note (E.)

An anecdote which I heard, many years ago, of a late very eminent Judge (Lord Mansfield) has often recurred to my memory, while reflecting on these apparent inconsistencies of intellectual character. A friend of his, who possessed excellent natural talents, but who had been prevented, by his professional duties as a naval officer, from bestowing on them all the cultivation of which they were susceptible, having been recently appointed to the government of Jamaica, happened to express some doubts of his competency to preside in the court of Chancery. Lord Mansfield assured him, that he would find the difficulty not so great as he apprehended. "Trust (he said) to your own good sense in forming your "opinions; but beware of attempting to state the grounds of your "judgments. The judgment will probably be right;—the argument will infallibly be wrong."

From what has been said, it seems to follow, that although a man should happen to reason ill in support of a sound conclusion, we are by no means entitled to infer with confidence, that he judged right merely by accident. It is far from being impossible that he may have committed some mistake in stating to others (perhaps in retracing to himself) the grounds upon which his judgment was really founded. Indeed, this *must* be the case, wherever a shrewd understanding in business is united with an incapacity for clear and luminous reasoning; and something of the same sort is incident, more or less, to all men (more particularly to men of quick parts) when they make an attempt, in discussions concerning human affairs, to remount to *first principles*. It may be added, that in the old, this correctness of judgment often remains, in a surprising degree, long after the discursive or argumentative power would seem, from some decay of attention, or confusion in the succession of ideas, to have been sensibly impaired by age or by disease.

In consequence of these views, as well as of various others foreign to the present subject, I am led to entertain great doubts about the solidity of a very specious doctrine laid down by Condorcet, in his "Essay on the Application of Mathematical Analysis to "the Probabilities of Decisions resting upon the Votes of a Majority." "It is extremely possible (he observes) that the decision which "unites in its favour the greatest number of suffrages, may comprehend a variety of propositions, some of which, if stated apart, "would have had a plurality of voices against them; and, as the "truth of a system of propositions supposes that each of the propositions composing it is true, the probability of the system can be "rigorously deduced only from an examination of the probability of "each proposition, separately considered."*

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* Essai sur l'Application de l'Analyse à la probabilité des Décisions rendues à la pluralité des Voix. *Disc. Prél.* pp. 46, 47.

Some of the expressions in the above quotation are not agreeable to the idiom of our language; but I did not think myself entitled to depart from the phraseology of the original. The meaning is sufficiently obvious.

this theory is applied to a court of law, it is well known to ne of the nicest questions in practical jurisprudence; and, ght, I do not presume to have formed any opinion with it. It may be doubted, perhaps, if it be not one of those , the solution of which, in particular instances, is more trusted to discretionary judgment, than to the rigorous n of any technical rule founded on abstract principles. ntroduced the quotation here, merely on account of the ich it has been supposed to afford, that the seeming diver- human belief fall, in general, greatly short of the reality. oint, the considerations already stated, strongly incline me in an idea directly contrary. My reasons for thinking so asily collected from the tenor of the preceding remarks. ime, however, to proceed to the examination of those s processes, the different steps of which admit of being stated and enunciated in the form of logical arguments; h, in consequence of this circumstance, furnish more cer- palpable data for our speculations. I begin with some on the Power of General Reasoning; for the exercise of s I formerly endeavoured to shew) the use of language, as ment of thought, is indispensably requisite.

SECTION II.

OF GENERAL REASONING.

I.

ations of some Remarks formerly stated in treating of Abstraction.

LD scarcely have thought it necessary to resume the con- n of abstraction here, if I had not neglected, in my first to examine the force of an objection to Berkeley's doctrine g abstract general ideas, on which great stress is laid by l in his essays on the Intellectual Powers of Man; and me late writers seem to have considered as not less conclu- nst the view of the question which I have taken. Of this I was aware from the first; but was unwilling, by replying rm, to lengthen a discussion which savoured so much of ls; more especially, as I conceived that I had guarded my ment from any such attack, by the cautious terms in which pressed it. Having since had reason to believe that I was te in forming this judgment, and that Reid's strictures on r's theory of general signs have produced a deeper impres- n I had expected,* I shall endeavour to obviate them, at

book entitled, Elements of Intellectual Philosophy, by the late learned and tted Mr. Scott, of King's College, Aberdeen, p. 118, et seq. (Edinburgh, ave not thought it necessary to reply to Mr. Scott's own reasonings, which do to me to throw much new light on the question; but I thought it right to refer e, that the reader may, if he pleases, have an opportunity of judging for himself.

least as far as they apply to myself, before entering on any new speculations, concerning our reasoning powers; and shall, at the same time, introduce some occasional illustrations of the principles which I formerly endeavoured to establish.

To prevent the possibility of misrepresentation, I state Dr. Reid's objection in his own words.

“ Berkeley, in his reasoning against abstract general ideas, seems
“ unwillingly or unwarily to grant all that is necessary to support
“ abstract and general conceptions.

“ A man (says Berkeley) may consider a figure merely as trian-
“ gular, without attending to the particular qualities of the angles,
“ or relations of the sides. So far he may abstract. But this will
“ never prove that he can frame an abstract general inconsistent
“ idea of a triangle.”

Upon this passage Dr. Reid makes the following remark: “ *If a*
“ *man may consider a figure merely as triangular, he must have some*
“ *conception of this object of his consideration; for no man can consider*
“ *a thing which he does not conceive. He has a conception, therefore,*
“ *of a triangular figure, merely as such. I know no more that is meant*
“ *by an abstract general conception of a triangle.*”

“ He that considers a figure merely as triangular (continues the
“ same author) must understand what is meant by the word trian-
“ gular. If to the conception he joins to this word, he adds any
“ particular quality of angles or relation of sides, he misunderstands
“ it, and does not consider the figure merely as triangular. Whence
“ I think it is evident, that he who considers a figure merely as
“ triangular, must have the conception of a triangle, abstracting
“ from any quality of angles or relations of sides.”*

For what appears to myself to be a satisfactory answer to this reasoning, I have only to refer to the first volume of these Elements. The remarks to which I allude are to be found in the third section of chapter fourth;† and I must beg leave to recommend them to the attention of my readers, as a necessary preparation for the following discussion.

In the farther prosecution of the same argument, Dr. Reid lays hold of an acknowledgment which Berkeley has made, “ That we
“ may consider *Peter* so far forth as man, or so far forth as animal,
“ in as much as all that is perceived is not considered.”—“ It may
“ here (says Reid) be observed, that he who considers *Peter* so far
“ forth as man, or so far forth as animal, must *conceive* the meaning
“ of those abstract general words *man* and *animal;* and he who
“ *conceives* the meaning of them, has an abstract general conception.”

According to the definition of the word *conception*, which I have given in treating of that faculty of the mind, a *general conception* is an obvious impossibility. But, as Dr. Reid has chosen to annex a more extensive meaning to the term than seems to me consistent with precision, I would be far from being understood to object to his conclusion, *merely* because it is inconsistent with an arbitrary definition of my own. Let us consider, therefore, how far his doctrine is consistent with itself; or rather, since both parties are evidently so nearly agreed about the principal fact, which of the two have adopted the more perspicuous and philosophical mode of stating it.

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* Reid's Intellectual Powers, p. 483, 4to edit.

† P. 195, 3d edit.

In the first place, then, let it be remembered as a thing admitted on both sides, "that we have a power of *reasoning* concerning a "figure considered merely as triangular, without attending to the "particular qualities of the angles, or relations of the sides;" and also, that "we may reason concerning *Peter* or *John*, considered so "far forth as *man*, or so far forth as *animal*." About these facts there is but one opinion; and the only question is, Whether it throws additional light on the subject, to tell us, in scholastic language, that "we are enabled to carry on these general reasonings, in "consequence of the power which the mind has of forming abstract "general conceptions." To myself it appears, that this last statement (even on the supposition that the word *conception* is to be understood agreeably to Dr. Reid's own explanation) can serve no other purpose than that of involving a plain and simple truth in obscurity and mystery. If it be used in the sense in which I have invariably employed it in this work, the proposition is altogether absurd and incomprehensible.

For the more complete illustration of this point, I must here recur to a distinction formerly made between the abstractions which are subservient to reasoning, and those which are subservient to imagination. "In every instance in which imagination is employed "in forming new wholes, by decompounding and combining the "perceptions of sense, it is evidently necessary that the poet or the "painter should be able to *state* or *represent* to himself the circum"stances abstracted, as separate objects of conception. But this is "by no means requisite in every case in which abstraction is sub"servient to the power of reasoning; for it frequently happens, "that we can reason concerning the quality or property of an "object abstracted from the rest, while, at the same time, we find "it impossible to conceive it separately. Thus, I can reason con"cerning extension and figure, without any reference to colour, "although it may be doubted, if a person possessed of sight can "make extension and figure steady objects of conception, without "connecting with them the idea of one colour or another. Nor is "this always owing (as it is in the instance just mentioned) merely "to the association of ideas; for there are cases, in which we can "*reason* concerning things separately, which it is impossible for us "to suppose any mind so constituted as to conceive apart. Thus "we can reason concerning length, abstracted from any other "dimension; although, surely, no understanding can make length, "without breadth, an object of conception."* In like manner, while I am studying Euclid's demonstration of the equality of the three angles of a triangle to two right angles, I find no difficulty in following his train of reason, although it has no reference whatever to the specific *size* or to the specific *form* of the diagram before me. I *abstract*, therefore, in this instance, from both of these circumstances presented to my senses by the immediate objects of my perceptions; and yet, it is manifestly impracticable for me either to delineate on paper, or to conceive in the mind, such a figure as shall not include the circumstances from which I abstract, as well as those on which the demonstration hinges.

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* Vol. I. pp. 157, 158, 3d edit.

In order to form a precise notion of the manner in which this process of the mind is carried on, it is necessary to attend to the close and inseparable connexion which exists between the faculty of general reasoning, and the use of artificial language. It is in consequence of the aids which *this* lends to our natural faculties, that we are furnished with a class of signs, expressive of all the circumstances which we wish our reasonings to comprehend; and, at the same time, exclusive of all those which we wish to leave out of consideration. The word *triangle*, for instance, when used without any additional epithet, confines the attention to the *three* angles and *three* sides of the figure before us; and reminds us, as we proceed, that no step of our deduction is to turn on any of the specific varieties which that figure may exhibit. The notion, however, which we annex to the word *triangle*, while we are reading the demonstration, is not the less a *particular* notion, that this word, from its partial or abstracted import, is equally applicable to an infinite variety of other individuals.*

These observations lead, in my opinion, to so easy an explanation of the transition from *particular* to *general reasoning*, that I shall make no apology for prosecuting the subject a little farther, before leaving this branch of my argument.

It will not, I apprehend, be denied, that when a learner *first* enters on the study of geometry, he considers the diagrams before him as individual objects, and as individual objects alone. In reading, for example, the demonstration just referred to, of the equality of the three angles of every triangle to two right angles, he thinks only of the triangle which is presented to him on the margin of the page. Nay, so completely does this particular figure engross his attention, that it is not without some difficulty he, in the first instance, transfers the demonstration to another triangle whose form is very different, or even to the same triangle placed in an inverted position. It is in order to correct this natural bias of the mind, that a judicious teacher, after satisfying himself that the student comprehends perfectly the force of the demonstration, as applicable to the particular triangle which Euclid has selected, is led to vary the diagram in different ways, with a view to show him, that the very same demonstration, expressed in the very same form of words, is equally applicable to them all. In this manner he comes, by slow degrees, to comprehend the nature of general reasoning, establishing insensibly in his mind this fundamental logical principle, that when the enunciation of a mathematical proposition involves only a certain portion of the attributes of the diagram which is employed to illustrate it, the same proposition must hold true of any other diagram involving the same attributes, how much soever distinguished from it by other specific peculiarities.*

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* "By this imposition of names, some of larger, some of stricter signification, we turn the reckoning of the consequences of things imagined in the mind, into a reckoning of the consequences of appellations. For example, a man that hath no use of speech at all (such as is born and remains perfectly deaf and dumb) if he set before his eyes a triangle, and by it two right angles (such as are the corners of a square figure) he may by meditation compare and find, that the three angles of that triangle, are equal to those right angles that stand by it. But if another triangle be shewn him, different in shape from the former, he cannot know, without a new labour, whether the three angles of that also be equal to the same. But he that hath the use of words, when he observes that such equality was consequent, not to the length of the sides, nor to any particular thing in this triangle; but only to this, that the sides were straight, andthe angles three; and that that was all for which he named it a triangle; will boldly conclude universally, that such equality of angles is in all triangles whatsoever; and register his invention in these general terms. *Every triangle hath its three angles equal to two right angles*. And thus the consequence found in one particular, comes to be registered and remembered as an universal rule; and discharges our mental reckoning of time and place; and delivers us from all labour of the mind, saving the first; and makes that which was found true *here*, and *now*, to be true in *all times* and *places*."—*Hobbes, of Man*, Part I. chap. iv.

Of all the generalizations in geometry, there are none into which the mind enters so easily, as those which relate to diversities in point of *size* or *magnitude*. Even in reading the very first demonstrations of Euclid, the learner almost immediately sees, that the *scale* on which the diagram is constructed, is as completely out of the question as the *breadth* or the *colour* of the lines which it presents to his external senses. The demonstration, for example, of the fourth proposition, is transferred, without any conscious process of reflection, from the two triangles on the margin of the page, to those comparatively large ones which a public teacher exhibits on his board or slate to a hundred spectators. I have frequently however, observed in beginners, while employed in copying such elementary diagrams, a disposition to make the copy, as nearly as possible, both in size and figure, a *fac simile* of the original.

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* In order to impress the mind still more forcibly with the same conviction, some have supposed that it might be useful, in an elementary work, such as that of Euclid, to omit the diagrams altogether, leaving the student to delineate them for himself, agreeably to the terms of the enunciation and of the construction. And were the study of geometry to be regarded merely as subservient to that of logic, much might be alleged in confirmation of this idea. Where, however, it is the main purpose of the teacher (as almost always happens) to familiarize the mind of his pupil with the fundamental principles of the science, as a preparation for the study of physics and other parts of mixed mathematics, it cannot be denied, that such a practice would be far less favourable to the memory than the plan which Euclid has adopted, of annexing to each theorem an appropriate diagram, with which the general truth comes very soon to be strongly associated. Nor is this circumstance found to be attended in practice with the inconvenience it may seen to threaten; in as much as the student, without any reflection whatever on logical principles, generalises the Particular example, according to the different cases which may occur, as easily and unconsciously as he could have applied to these cases the general enunciation.

The same remark may be extended to the other departments of our knowledge; in all of which it will be found useful to associate with every important general conclusion some particular example or illustration, calculated, as much as possible, to present an impressive image to the power of conception. By this means, while the example gives us a firmer hold, and a readier command of the general theorem, the theorem, in its turn, serves to correct the errours into which the judgment might be led by the specific peculiarities of the example. Hence, by the way, a strong argument in favour of the practice recommended by Bacon, of connecting *emblems* with *praenotions*, as the most powerful of all *adminicles* to the faculty of memory; and hence the aid which this faculty may be expected to receive, in point of promptitude, if not of correctness, from a lively imagination. Nor is it the least advantage of this practice, that it supplies us at all times with ready and apposite illustrations to facilitate the communication of our general conclusions to others. But the prosecution of these hints would lead me too far astray from the subject of this section.

The generalizations which extend to varieties of *form* and of *position*, are accomplished much more slowly; and, for this obvious reason, that these varieties are more strongly marked and discriminated from one another, as objects of vision and of conception. How difficult (comparatively speaking) in such instances, the generalizing process is, appears manifestly from the embarrassment which students experience, in applying the fourth proposition to the demonstration of the fifth. The inverted position, and the partial coincidence of the two little triangles below the base, seem to render their mutual relation so different from that of the two separate triangles which had been previously familiarized to the eye, that it is not surprising this step of the reasoning be followed, by the mere novice, with some degree of doubt and hesitation. Indeed, where nothing of this sort is manifested, I should be more inclined to ascribe the apparent quickness of his apprehension to a retentive memory, seconded by implicit faith in his instructor; than to regard it as a promising symptom of mathematical genius.

Another, and perhaps a better illustration of that natural logic which is exemplified in the generalization of mathematical reasonings, may be derived from those instances where the same demonstration applies, in the same words, to what are called, in geometry, the different *cases* of a proposition. In the commencement of our studies, we read the demonstration over and over, applying it successively to the different diagrams; and it is not without some wonder we discover, that it is equally adapted to them all. In process of time, we learn that this labour is superfluous; and if we find it satisfactory in one of the *cases*, can anticipate with confidence the justness of the general conclusion, or the modifications which will be necessary to accommodate it to the different forms of which the hypothesis may admit.

The algebraical *calculus*, however, when applied to geometry, places the foregoing doctrine in a point of view still more striking; “ representing (to borrow the words of Dr. Halley) all the possible cases of a problem at one view; and often in one general theorem comprehending whole sciences; which deduced at length into propositions, and demonstrated after the manner of the ancients, might well become the subject of large treatises.”* Of this remark, Halley gives an instance in a *formula*, which, when he first published it, was justly regarded "as a notable instance of the "great use and comprehensiveness of algebraic solutions." I allude to his formula for finding universally the foci of optic lenses; an example which I purposely select, as it cannot fail to be familiarly known to all who have the slightest tincture of mathematical and physical science.

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* Philos. Transact. No. 205. Miscell. Cur. Vol. I. p. 348.

In such instances as these, it will not surely be supposed, that while we read the geometrical demonstration, or follow the successive steps of the algebraical process, our *general conceptions* embrace all the various possible cases to which our reasonings extend. So very different is the fact, that the wide grasp of the conclusion is discovered only by a sort of subsequent *induction;* and, till habit has familiarized us with similar discoveries, they never fail to be attended with a certain degree of unexpected delight. Dr. Halley seems to have felt this strongly when the optical *formula* already mentioned first presented itself to his mind.

In the foregoing remarks, I have borrowed my examples from mathematics, because, at the period of life when we enter on this study, the mind has arrived at a sufficient degree of maturity to be able to reflect accurately on every step of its own progress; whereas, in those general conclusions to which we have been habituated from childhood, it is quite impossible for us to ascertain, by any direct examination, what the processes of thought were, which originally led us to adopt them. In this point of view, the first doubtful and unassured steps of the young geometer present to the logician a peculiarly interesting and instructive class of phenomena, for illustrating the growth and development of our reasoning powers. The true theory, more especially of *general reasoning*, may be here distinctly traced by every attentive observer; and may hence be confidently applied (under due limitations) to all the other departments of human knowledge.*

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* The view of general reasoning which is given above, appears to myself to afford (without any comment) a satisfactory answer to the following argument of the late worthy and learned Dr. Price: "That the universality consists in the *idea*, and not merely in the name, as used to signify a number of particulars, *resembling* that which is the immediate object of reflection, is plain; because, was the idea to which the name answers, and which it recalls into the mind, only a particular one, we could not know to what other ideas to apply it, or what particular objects had the resemblance necessary to bring them within the meaning of the name. A person, in reading over a mathematical demonstration, certainly is conscious that it relates to somewhat else, than just that precise figure presented to him in the diagram. But if he knows not what else, of what use can the demonstration be to him? How is his knowledge enlarged by it? Or how shall he know afterwards to what to apply it?"

In a note upon this passage, Dr. Price observes, that "according to Dr. Cudworth, abstract ideas are implied in *the cognoscitive power of the mind; which, he says, contains in itself virtually (as the future plant or tree is contained in the seed) general notions or exemplars of all things, which are exerted by it, or unfold and discover themselves, as occasions invite, and proper circumstances occur.*" "This, no doubt, (Dr. Price adds) many will very freely condemn as whimsical and extravagant. I have, I own, a different opinion of it; but yet I should not care to be obliged to defend it."—*Review of the Principal Questions in Morals.* pp. 38, 39, 2d edit

For my own part, I have no scruple to say, that I consider this fancy of Cudworth as not only *whimsical and extravagant*, but as altogether unintelligible; and yet it appears

From what has been now said, it would appear, that, in order to arrive at a general conclusion in mathematics (and the same observation holds with respect to other sciences) *two* different processes of reasoning are necessary. The one is *the demonstration* of the proposition in question; in studying which, we certainly think of nothing but the individual diagram before us. The other is, the train of thought by which we transfer the particular conclusion to which we have been thus led, to any other diagram to which the same enunciation is equally applicable. As this last train of thought is, in all cases, essentially the same, we insensibly cease to repeat it when the occasion for employing it occurs, till we come at length, without any reflection, to generalize our particular conclusion, the moment it is formed; or, in other words, to consider it as a proposition comprehending an indefinite variety of particular truths. When this habit is established, we are apt to imagine,—forgetting the slow steps by which the habit was acquired,—that the general conclusion is an *immediate* inference from a general demonstration; and that, although there was only one particular diagram present to our external senses, we must have been aware, at every step, that our thoughts were really conversant, *not* about this diagram, but about *general ideas*, or, in Dr. Reid's language, *general conceptions*. Hence the familiar use among logicians of these scholastic and mysterious phrases, which, whatever attempts may be made to interpret them in a manner not altogether inconsistent with good sense, have unquestionably the effect of keeping out of view the real procedure of the human mind in the generalization of its knowledge.

Dr. Reid seems to be of opinion, that it is by the power of forming *general conceptions*, that man is distinguished from the brutes; for he observes, that "Berkeley's system goes to destroy the barrier between the rational and animal natures." I must own I do not perceive the justness of this remark, at least in its application to the system of the nominalists, as I have endeavoured to explain and to limit it in the course of this work. On the contrary, it appears to me, that the account which has been just given of *general reasoning*, by ascribing to a process of *logical deduction* (presupposing the previous exercise of *abstraction* or *analysis*) what Dr. Reid attempts to explain by the scholastic, and not very intelligible phrase of *general conceptions*, places the distinction between man and brutes in a far clearer and stronger light, than that in which philosophers have been accustomed to view it. That it is to the exclusive possession

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to me, that some confused analogy of the same sort must exist in the mind of every person who imagines that he has the power of forming *general conceptions* without the intermediation of language.

In the continuation of the same note, Dr. Price seems disposed to sanction another remark of Dr. Cudworth: in which *he pronounces the opinion of the nominalists to be so ridiculous and false, as to deserve no confutation.* I suspect, that when Dr. Cudworth wrote this splenetic and oracular sentence, he was out of humour with some argument of Hobbes, which he found himself unable to answer. It is not a little remarkable, that the doctrine which he here treats with so great contempt, should, with a very few exceptions, have united the suffrages of all the soundest philosophers of the eighteenth century.

of the faculty of *abstraction*, and of the other powers subservient to the use of general signs, that our species is chiefly indebted for its superiority over the other animals, I shall afterwards endeavour to show.

It still remains for me to examine an attempt which Dr. Reid has made, to convict Berkeley of an *inconsistency*, in the statement of his argument against abstract general ideas. "Let us now consider "(says he) the Bishop's notion of generalizing. An idea (he tells "us) which, considered in itself, is particular, becomes general, by "being made to represent or stand for all other particular ideas of "the same sort. To make this plain by an example: Suppose (says "Berkeley) a geometrician is demonstrating the method of cutting "a line into two equal parts. He draws, for instance, a black line "of an inch in length. This, which is in itself a particular line, is "nevertheless, with regard to its signification, general, since, as it is "there used, it represents all particular lines whatsoever, so that "what is demonstrated of it, is demonstrated of all lines, or, in other "words, of a line in general. And as that particular line becomes "general by being made a sign, so the name *line*, which, taken abso"lutely, is particular, by being a sign, is made general.

"Here (continues Dr. Reid) I observe, that when a particular "idea is made a sign to represent and stand for *all of a sort*, this sup"poses a distinction of things into sorts or species. To be of *a sort*, "implies having those attributes which characterize the sort, and "are common to all the indviduals that belong to it. There cannot "therefore be *a sort*, without general attributes; nor can there be "any conception of a sort without a conception of those general at"tributes which distinguish it. The conception of *a sort*, therefore, "is an abstract general conception.

"The particular idea cannot surely be made a sign of a thing of "which we have no conception. I do not say, that you must have "*an idea* of the sort; but surely you ought to *understand* or *conceive* "what it means, when you make a particular idea a representative "of it; otherwise your particular idea represents you know not "what."*

Although I do not consider myself as called upon to defend all the expressions which Berkeley may have employed in support of his opinion on this question, I must take the liberty of remarking, that, in the present instance, he appears to me to have been treated with an undue severity. By *ideas of the same sort*, it is plain he meant nothing more than *things called by the same name*, and, consequently, (if our illustrations are to be borrowed from mathematics) *comprehended under the terms of the same definition*. In such cases, the individuals thus classed together are completely *identified* as subjects of reasoning; in so much, that what is proved with respect to one individual, must hold equally true of all the others. As it is an axiom in geometry, that things which are equal to one and the same thing, are equal to one another; so it may be stated as a maxim in logic, that whatever things have the same *name* applied to them, in consequence of their being comprehended in the terms of the same definition, may all be considered as *the same identical subject*, in every case where that definition is the principle on which our reasoning proceeds. In reasoning, accordingly, concerning any *sort* or *species* of things, our thoughts have no occasion to wander from the individual *sign* or *representative* to which the attention happens to be directed, or to attempt the fruitless task of grasping at those specific varieties which are avowedly excluded from the number of our premises. As every conclusion which is logically deduced from the definition must, of necessity, hold equally true of all the individuals to which the common name is applicable, these individuals are regarded merely as so many *units*, which go to the composition of the multitude comprehended under the collective or generic term. Nor has the power of conception any thing more to do in the business, than when we think of the *units* expressed by a particular number in arithmetical computation.

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* Pages 484, 485.

The word *sort* is evidently transferred to our intellectual arrangements, from those distributions of material objects into separate heaps or collections, which the common sense of mankind universally leads them to make for the sake of the memory; or (which is perhaps nearly the same thing) with a view to the pleasure arising from the perception of order. A familiar instance of this presents itself in the shelves, and drawers, and parcels, to which every shopkeeper had recourse, for assorting, according to their respective denominations and prices, the various articles which compose his stock of goods. In one parcel (for example) he collects and incloses under one common *envelope*, all his *gloves* of a particular size and quality; in another, all his *gloves* of a different size and quality; and, in like manner he proceeds with the stockings, shoes, hats, and the various other commodities with which his warehouse is filled. By this means, the attention of his shopboy, instead of being bewildered among an infinitude of particulars, is confined to *parcels* or *assortments* of particulars; of each of which parcels a distinct idea may be obtained from an examination of any one of the individuals contained in it. These individuals, therefore, are, in his apprehension, nothing more than so many *units* in a multitude, any one of which units is perfectly equivalent to any other; while, at the same time, the parcels themselves, notwithstanding the multitude of units of which they are made up, distract his attention and burden his memory as little, as if they were individual articles. The truth is, that they become to his mind *individual objects of thought*, like a *box* of counters, or a *rouleau* of guineas, or any of the other material aggregates with which his senses are conversant; or, to take an example still more apposite to our present purpose, like the phrases *one* thousand, or *one* million, when considered merely as simple *units* entering into the composition of a numerical sum.

The task which I have here supposed the tradesman to perform, in order to facilitate the work of his shop-boy, is exactly analogous, in its effect, to the aid which is furnished to the infant understanding by the structure of its mother-tongue; the generic words which abound in language assorting, and (if I may use the expression) *packing up*, under a comparatively small number of comprehensive terms, the multifarious objects of human knowledge.* In consequence of the generic terms to which, in civilized society, the mind is early familiarized, the vast multiplicity of things which compose the furniture of this globe are presented to it, *not* as they occur to the senses of the untaught savage, but as they have been arranged and distributed into parcels or assortments by the successive observations and reflections of our predecessors. Were these arrangements and distributions agreeable, in every instance, to sound philosophy, the chief source of the errours to which we are liable in all our general conclusions, would be be removed; but it would be too much to expect (with some late theorists) that, even in the most advanced state either of physical or of moral science, this supposition is ever to be realized in all its extent. At the same time, it must be remembered, that the obvious tendency of the progressive reason and experience of the species, is to diminish more and more the imperfections of the classifications which have been transmitted from ages of comparative ignorance; and, of consequence, to render language more and more a safe and powerful organ for the investigation of truth.

The only science which furnishes an exception to these observations is *mathematics*; a science essentially distinguished from every other by this remarkable circumstance, that the precise import of its generic terms is fixed and ascertained by the *definitions* which form the basis of all our reasonings, and in which, of consequence, the very possibility of errour in our classifications is precluded by the virtual identity of all those hypothetical objects of thought to which the same generic term is applied.

I intend to prosecute this subject farther, before concluding my observations on general reasoning. At present, I have only to add to the foregoing remarks, that, in the comprehensive theorems of the philosopher, as well as in the assortments of the tradesman, I cannot perceive a single step of the understanding, which implies any thing more than the notion of *number*, and the use of a common name.

Upon the whole, it appears to me, that the celebrated dispute concerning abstract general ideas, which so long divided the schools, is now reduced, among correct thinkers, to this simple question of fact, Could the human mind, *without the use of signs of one kind or another*, have carried on general reasonings, or formed general conclusions? Before arguing with any person on the subject, I should wish for a categorical explanation on this preliminary point. Indeed, every other controversy connected with it turns on little more than the meaning of words.

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* The same analogy had occurred to Locke. "To shorten its way to knowledge, and make each perception more comprehensive, the mind binds them into bundles."

A difference of opinion with respect to this question of *fact* (or rather, I suspect, a want of attention in some of the disputants to the great variety of *signs* of which the mind can avail itself, independently of words) still continues to keep up a sort of distinction between the Nominalists and the Conceptualists. As for the Realists, they may, I apprehend, be fairly considered, in the present state of science, as having been already forced to lay down their arms.

That the doctrine of the nominalists has been stated by some writers of note in very unguarded terms, I do not deny,* nor am I certain that it was ever delivered by any one of the schoolmen in a form completely unexceptionable; but after the luminous, and, at the same time, cautious manner in which it has been unfolded by Berkeley and his successors, I own it appears to me not a little surprising, that men of talents and candour should still be found inclined to shut their eyes against the light, and to shelter themselves in the darkness of the middle ages. For my own part, the longer and the more attentively that I reflect on the subject, the more am I disposed to acquiesce in the *eulogium* bestowed on Roscellinus and his followers by Leibnitz; one of the very few philosophers, if not the only philosopher, of great celebrity, who seems to have been fully aware of the singular merits of those by whom this theory was originally proposed: "SECTA NOMINALIUM, OMNIUM INTER SCHOLASTICAS PRO-

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* Particularly by Hobbes, some of whose incidental remarks and expressions would certainly, if followed strictly out to their logical consequences, lead to the complete subversion of truth, as a thing real, and independent of human opinion. It is to this, I presume, that Leibnitz alludes, when he says of him, "*Thomas Hobbes, qui ut rerum fatear, mihi plus quam nominalis videtur.*"†

I shall afterwards point out the mistake by which Hobbes seems to me to have been misled. In the mean time, it is but justice to him to say, that I do not think he had any intention to establish those sceptical conclusions, which, it must be owned, may be fairly deduced as corollaries from some of his principles. Of this I would not wish for a stronger proof than his favourite maxim, that "words are the *counters* of wise men, but the *money* of fools;" a sentence which expresses, with marvellous conciseness, not only the proper function of language, as an instrument of reasoning, but the abuses to which it is liable, when in unskilful hands.

Dr. Gillies, who has taken much pains to establish Aristotle's claims to all that is valuable in the doctrine of the nominalists, has, at the same time, represented him as the only favourer of this opinion, by whom it has been taught without any admixture of those errors which are blended with it in the works of its modern revivers. Even Bishop Berkeley himself is involved with Hobbes and Hume in the same sweeping sentence of condemnation. "The language of the nominalists seems to have been extremely liable to be perverted to the purposes of scepticism, as taking away the specific distinctions of things; and is in fact thus perverted by Hobbes, Berkeley, Hume, *and their innumerable followers.* But Aristotle's language is not liable to this abuse." (*Gillies's Aristotle*, Vol. I. p. 71, 2d edit.)

Among these sceptical followers of Berkeley, we must, I presume, include the late learned and ingenious Dr. Campbell; whose remarks on this subject I will, nevertheless, venture to recommend to the particular attention of my readers. Indeed I do not know of any writer who has treated it with more acuteness and perspicuity. (See *Philosophy of Rhetoric*, Book II. chap. vii.)

† Thomas Hobbes, who, to speak plainly, appears to me to have carried the principles of the Nominalists much too far.

“FUNDISSIMA, ET HODIERNAE REFORMATAE PHILOSOPHANDI RATIONI CON- “GRUENTISSIMA.”* It is a theory, indeed, much more congenial to the spirit of the eighteenth than of the eleventh century; nor must it be forgotten, that it was proposed and maintained at a period when the algebraical art (or to express myself more precisely, *universal arithmetic*) from which we now borrow our best illustrations in explaining and defending it, was entirely unknown.

II.

Continuation of the Subject.—Of language considered as an instrument of Thought.

HAVING been led, in defence of some of my own opinions, to introduce a few additional remarks on the controversy with respect to the theory of *general reasoning*, I shall avail myself of this opportunity to illustrate a little farther *another* topic, (intimately connected with the foregoing argument) on which the current doctrines of modern logicians seem to require a good deal more of explanation and restriction than has been commonly apprehended. Upon this subject I enter the more willingly, that, in my first volume, I have alluded to these doctrines in a manner which may convey, to some of my readers, the idea of a more complete acquiescence, on *my* part, in their truth, than I am disposed to acknowledge.

In treating of abstraction, I endeavoured to show that we *think*, as well as *speak*, by means of words, and that, without the use of language, our reasoning faculty (if it could have been at all exercised) must necessarily have been limited to *particular* conclusions alone. The effects, therefore, of ambiguous and indefinite terms are not confined to our communications with others, but extend to our private and solitary speculations. Dr. Campbell, in his Philosophy of Rhetoric, has made some judicious and important observations on this subject; and, at a much earlier period, it drew the attention of Des Cartes; who, in the course of a very valuable discussion with respect to the sources of our errours, has laid particular stress on those to which we are exposed from the employment of language as an instrument of thought. “And, lastly, in consequence of the “habitual use of speech, all our ideas become associated with the “words in which we express them; nor do we ever commit these “ideas to memory, without their accustomed signs. Hence it is, “that there is hardly any one subject, of which we have so distinct “a notion as to be able to think of it abstracted from all use of lan- “guage; and, indeed, as we remember words more easily than “things, our thoughts are much more conversant with the former “than with the latter. Hence, too, it is, that we often yield our “assent to propositions, the meaning of which we do not understand; “imagining that we have either examined formerly the import of

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* The sect of *Nominalists*, the most profound of all the scholastic sects, and coinciding, for the most part, with the present reformed method of philosophizing.

"all the terms involved in them, or that we have adopted these "terms on the authority of others upon whose judgment we can "rely."*

To these important considerations, it may be worth while to add, that whatever improvements may yet be made in language by philosophers, they never can relieve the student from the indispensible task of analyzing with accuracy the complex ideas he annexes to the terms employed in his reasonings. The use of general terms, as Locke has remarked, is learned, in many cases, before it is possible for us to comprehend their meaning; and the greater part of mankind continue to use them through life, without ever being at the trouble to examine accurately the notions they convey. This is a study which every individual must carry on for himself; and of which no rules of logic (how useful soever they may be in directing our labours) can supersede the necessity.

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* "Et denique, propter loquelae usum, conceptus omnes nostros verbis, quibus eos exprimimus, alligamus, nec eos, nisi simul cum istis verbis, memoriae mandamus. Cumque facilius postea verborum quam rerum recordemur, vix unquam ullius rei conceptum habemus tam distinctum, ut illum ab omni verborum conceptu separemus; cogitationesque hominum fere omnium circa verba magis quam circa res versantur; adeo ut persaepe vocibus non intellectis praebeant assensum, quia putant se illas olim intellexisse, vel ab aliis qui eas recte intelligebant accepisse."—*Princ. Phil.* Pars Prima, lxxiv.

I have quoted a very curious passage, nearly to the same purpose, from Leibnitz, in a note annexed to my first volume (see note L.) I was not then aware of the previous attention which had been given to this source of errour by Des Cartes; nor did I expect to find so explicit an allusion to it in the writings of Aristotle, as I have since observed in the following paragraph:

Διο και των παρα την λεξιν ὀυτος ὁ τροπος θετεος· πρωτον μεν, ὀτι μαλλον ἡ απατη γινεται μετ' αλλων σκοπουμενοις η καθ' ἑαυτους· ἡ μεν γαρ μετ' αλλου σκεψις δια λογου· ἡ δε καθ' ἀυτους, ουχ ἡττον δι' αυτου του πραγματος· ειτα, και καθ' ἀυτους απατασθαι συμβαινει, ὀταν επι του λογου ποιηται την σκεψιν· ετι, ἡ μεν απατη εκ της ὁμοιοτητος· ἡ δε ὁμοιοτης, εκ της λεξεως.—*De Sophist. Elenchis*, Lib. I. cap. vii.

"Quocirca inter eos (Paralogismos) qui in dictione consistunt, hic fallendi modus est ponendus. Primum, quia magis decipimur considerantes cum aliis, quàm apud nosmetipsos: nam consideratio cum aliis per sermonem instituitur; apud nosmetipsos autem non minus fit per rem ipsam. Deinde et per nosmetipsos ut fallamur accidit, cum in rebus considerandis sermo adhibetur: Praeterea deceptio est ex similitudine: similitudo autem ex dictione."†—Edit. *Du Val.* Vol. I. p. 289.

Lest it should be concluded, however, from this detached remark, that Aristotle had completely anticipated Locke and Condillac in their speculations with respect to language, considered as *an instrument of thought*. I must beg of my readers to compare it with the previous enumeration given by the same author, of those paralogisms or fallacies which lie *in the diction*, (*De Sophist. Elenchis*, Lib. i. cap. 4.)—recommending to them, at the same time, as a useful comment on the original, the twentieth chapter of the third book of a work entitled *Institutio Logica*, by the learned and justly celebrated Dr. Wallis of Oxford. I select this work in preference to any other modern one on the same subject, as it has been lately pronounced, by an authority for which I entertain a sincere respect, to be "a complete and accurate treatise of logic, strictly according to the Aristotelian method;" and as we are farther told that it is "still used by many in the university to which Wallis belonged, as the lecture-book in that department of study." I intend to quote part of this chapter on another occasion. At present, I shall only observe, that it does not contain the slightest reference to the passage which has led me to introduce these observations; and which, I believe, will be now very generally allowed to be of greater value than all those puerile distinctions put together, which Dr. Wallis had been at so much pains to illustrate and to exemplify.

† Wherefore among the fallacies arising from the diction, these must be enumerated: First, that when engaged in philosophical investigations, in connexion with others, we are more liable to deception than when alone; and the reason is, that with others these inquiries are carried on by means of language, whereas when alone, we judge not less by the thing itself. Then again, we are often deceived when alone, if the investigation be carried on by means of language; for mistake arises from resemblance, and resemblance from the diction.

Of the essential utility of a cautious employment of words, both as a medium of communication and as an instrument of thought, many striking illustrations might be produced from the history of science during the time that the scholastic jargon was current among the learned; a technical phraseology, which was not only ill-calculated for the discovery of truth, but which was dexterously contrived for the propagation of errour; and which gave to those who were habituated to the use of it, great advantages in controversy (at least in the judgment of the multitude) over their more enlightened and candid opponents. "A blind wrestler, by fighting in a dark chamber (to adopt "an allusion of Des Cartes) may not only conceal his defect, but "may enjoy some advantages over those who see. It is the light "of day only that can discover his inferiority." The imperfections of this philosophy, accordingly, have been exposed by Des Cartes and his followers, less by the force of their reasonings, than by their teaching men to make use of their own faculties, instead of groping in the artificial darkness of the schools; and to perceive the folly of expecting to advance science, by ringing changes on words to which they annexed no clear or precise ideas.

In consequence of the influence of these views, the attention of our soundest philosophers was more and more turned, during the course of the last century, to the cultivation of that branch of logic which relates to the use of words. Mr. Locke's observations on this subject form perhaps the most valuable part of his writings; and, since his time, much additional light has been thrown upon it by Condillac and his successors.

Important, however, as this branch of logic is in its practical applications; and highly interesting, from its intimate connexion with the theory of the human mind, there is a possibility of pushing, to an erroneous and dangerous extreme, the conclusions to which it has led. Condillac himself falls, in no inconsiderable degree, under this censure; having, upon more than one occasion, expressed himself as if he conceived it to be possible, by means of precise and definite terms, to reduce reasoning, in all the sciences, to a sort of mechanical operation, analogous, in its nature, to those which are practised by the algebraist, on letters of the alphabet. "The art of "reasoning (he repeats over and over) is nothing more than a language well arranged."—"L'art de raisonner se réduit à une langue bien faite."

One of the first persons, as far as I know, who objected to the vagueness and incorrectness of this proposition, was M. De Gerando; to whom we are farther indebted for a clear and satisfactory exposition of the very important *fact* to which it relates. To this fact Condillac approximates nearly in various parts of his works; but never, perhaps, without some degree of indistinctness and of exaggeration. The point of view in which it is placed by his ingenious successor, strikes me as so just and happy, that I cannot deny myself the pleasure of enriching my book with a few of his observations.

" It is the distinguishing characteristic of a lively and vigorous " conception, to push its speculative conclusions somewhat beyond " their just limits. Hence, in the logical discussions of this estima- " ble writer, these maxims (stated without any explanation or re- " striction,) '*That the study of a science is nothing more than the acqui-* " *sition of a language*;' and, '*that a science properly treated is only* " *a language well-contrived.*' Hence the rash assertion, '*That mathe-* " *matics possess no advantage over other sciences, but what they derive* " *from a better phraseology; and that of all these might attain to the same* " *characters of simplicity and of certainty, if we knew how to give* " *them signs equally perfect.*' "*

" The same task which must have been executed by those who " contributed to the first formation of a language, and which is exe- " cuted by every child when he learns to speak it, is repeated over " in the mind of every adult when he makes use of his mother- " tongue; for it is only by the decomposition of his thoughts, that " he can learn to select the signs which he ought to employ, and to " dispose them in a suitable order. Accordingly, those external ac- " tions which we call *speaking* or *writing*, are always accompanied " with a philosophical process of the understanding, unless we con- " tent ourselves, as too often happens, with repeating over mechan- " ically what has been said by others. It is in *this* respect that lan- " guages, with their forms and rules, conducting (so to speak) those " who use them, into the path of a regular analysis; tracing out to " them, in a well-ordered discourse, the model of a perfect decom- " position, may be regarded, *in a certain sense* as *analytical methods.* " —But I stop short: Condillac, to whom this idea belongs, has de- " veloped it too well to leave any hope of improving upon his " statement."

In a note upon this passage, however, M. De Gerando has certainly improved not a little on the statement of Condillac. " In asserting " (says he) that languages may be regarded as analytical methods, I " have added the qualifying phrase, *in a certain sense*; for the word " *method* cannot be employed here with exact propriety. Langua- " ges furnish the *occasions* and the *means of analysis*; that is to say, " they afford us assistance in *following* that method; but they are " not the method itself. They resemble signals or finger-posts " placed on a road to enable us to discover our way; and if they " help us to analyze, it is because they are themselves the results, " and, as it were, the monuments of an analysis which has been pre- " viously made; nor do they contribute to keep us in the right path, but " in proportion to the degree of judgment with which that analysis " has been conducted."†

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* Des Signes et de l'Art de Penser, &c. Introd. pp. xx. xxi.

† Ibid. pp. 158, 159, Tom. I.

I was the more solicitous to introduce these excellent remarks, as I suspect that I have myself indirectly contributed to propagate in this country the erroneous opinion which it is their object to correct. By some of our later writers it has not only been implicitly adopted, but has been regarded as a conclusion of too great value to be suffered to remain in the quiet possession of the moderns. "Aristotle "(says the author of a very valuable analysis of his works) *well* "*knew* that our knowledge of *things* chiefly depending on the pro- "per application of language as an INSTRUMENT OF THOUGHT, the true "art of reasoning is nothing but a language accurately defined and "skilfully arranged; an opinion which, after many idle declamations "against his barren generalities and verbal trifling, philosophers "have begun very generally to adopt."[*]

After this strong and explicit assertion of the priority of Aristotle's claim to the opinion which we are here told "*philosophers begin very generally to adopt*," it is to be hoped, that M. De Gerando will be in future allowed to enjoy the undisputed honour, of having seen a little farther into this fundamental article of logic than the Stagirite himself.

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[*] Aristotle's Ethics, &c. by Dr. Gillies, Vol. I. p. 94, 2d edit.

The passage in my first volume, to which I suspect an allusion is here made, is as follows:

"The technical terms in the different sciences, render the appropriate language of philosophy a still more convenient INSTRUMENT OF THOUGHT, than those languages which have originated from popular use; and in proportion as these technical terms improve in point of precision and of comprehensiveness, they will contribute to render our intellectual progress more certain and more rapid. 'While engaged (says Mr. Lavoisier) in the composition of my Elements of Chemistry, I perceived, better than I had ever done before, the truth of an observation of Condillac, that we think only through the medium of words, and that *languages are true analytic methods.* Algebra, which, of all our modes of expression, is the most simple, the most exact, and the best adapted to its purpose, is, at the same time, a language and an analytical method. *The art of reasoning is nothing more than a language well arranged.*' The influence (I have added) which these very enlightened and philosophical views have already had on the doctrines of chemistry, cannot fail to be known to most of my readers."

When this paragraph was first written, I was fully aware of the looseness and indistinctness of Lavoisier's expressions; but as my only object in introducing the quotation was to illustrate the influence of general logical principles on the progress of particular sciences, I did not think it necessary, in the *introduction* to my work, to point out in what manner Condillac's propositions were to be limited and corrected. I am truly happy, for the sake of M. De Gerando, that I happened to transcribe them in the same vague and very exceptionable terms, in which I found them sanctioned by the names of Condillac, and one of the most illustrious of his disciples.

It will not, I hope, be considered as altogether foreign to the design of this note, if I remark further, how easy it is for a translator of Aristotle (in consequence of the unparallelled brevity which he sometimes affects) to accommodate the sense of the original, by the help of paraphrastical clauses, expressed in the phraseology of modern science, to every progressive step in the history of human knowledge. In truth there is not one philosopher of antiquity, whose opinions, when they are stated in any terms but his own, are to be received with so great distrust.

The unsoundness of Condillac's assertion, that *the art of reasoning is nothing more than a language well arranged*, was, I believe, first pointed out by M. Prevost.—See some acute and decisive objections to this proposition in his Treatise *Des Signes*, &c. Paris, An. VIII. p. 20.

III.

Continuation of the Subject.—Visionary Theories of some Logicians, occasioned by their inattention to the Essential Distinction between Mathematics and other Sciences.

In a passage already quoted from De Gerando, he takes notice of what he justly calls *a rash assertion of Condillac*, “That mathematics possess no advantages over other sciences, but what they derive from a better phraseology; and that all of them might attain to the same characters of simplicity and of certainty, if we knew how to give them *signs* equally perfect.”

Leibnitz seems to point at an idea of the same sort, in those obscure and enigmatical hints (not altogether worthy, in my opinion, of his powerful and comprehensive genius) which he has repeatedly thrown out about the miracles to be effected by a new art of his own invention; to which art he sometimes gives the name of *Ars Combinatoria Characteristica*; and sometimes of *Ars Combinatoria Generalis ac Vera*. In one of his letters to Mr. Oldenburg, he speaks of a plan he had long been meditating, of treating of the science of mind by means of mathematical demonstrations. “Many wonderful things (he adds) of this kind have occurred to me; which at some future period, I shall explain to the public with that logical precision which the subject requires.”* In the same letter, he intimates his belief in the possibility of inventing an art, “which, with an exactitude resembling that of mechanism, may render the operations of reason steady and visible, and, in their effects on the minds of others, irresistible.”† After which he proceeds thus:

“Our common algebra, which we justly value so highly, is no more than a branch of that general art which I have here in view. But, such as it is, it puts it out of our power to commit an error, even although we should wish to do so; while it exhibits truth to our eyes like a picture stamped on paper by means of a machine. It must at the same time be recollected, that algebra is indebted for whatever it accomplishes in the demonstration of *general* theorems to the suggestions of a higher science; a science which I have been accustomed to call *characteristical combination*; very different, however, in its nature, from that which these words are likely at first to suggest to the hearer. The marvellous utility of this art I hope to illustrate, both by precepts and examples, if I shall be so fortunate as to enjoy health and leisure.

“It is impossible for me to convey an adequate idea of it in a short description. But this I may venture to assert, that no instrument (or organ) could easily be imagined of more powerful effica-

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* “Multa in hoc genere mira à me sunt observata, quae aliquando, quo par est rigore, exposita dabo.”

† “Quod velut mechanica ratione fixam et visibilem et (ut ita dicam) irresistibilem reddat rationem.”

"cy for promoting the improvement of the human understanding; and that, supposing it to be adopted as the common method of philosophizing, the time would very soon arrive, when we should be able to form conclusions concerning God and the Mind, with not less certainty than we do at present concerning figures and numbers."*

The following passage is translated from another letter of Leibnitz to the same correspondent:

"The matter in question depends on another of much higher moment; I mean, on a *general and true art of combination*, of the extensive influence of which I do not know that any person has yet been fully aware. This, in truth, does not differ from that sublime analysis, into the recesses of which Des Cartes himself, as far as I can judge, was not able to penetrate. But, in order to carry it into execution, an alphabet of human thoughts must be previously formed; and for the invention of this alphabet, an analysis of axioms is indispensibly necessary. I am not, however, surprised, that nobody has yet sufficiently considered it; for we are, in general, apt to neglect what is easy; and to take many things for granted, from their apparent evidence; faults which, while they remain uncorrected, will for ever prevent us from reaching the summit of things intellectual, by the aid of a *calculus* adapted to moral as well as to mathematical science."†

In these extracts from Leibnitz, as well as in that quoted from Condillac, in the beginning of this article, the essential distinction between mathematics and the other sciences, in point of phraseology, is entirely overlooked. In the former science, where the use of an ambiguous word is impossible, it may be easily conceived how the solution of a problem, may be reduced to something resembling the operation of a mill,—the conditions of the problem, when once translated from the common language into that of algebra, disappearing entirely from the view; and the subsequent process being almost mechanically regulated by general rules, till the final result is obtained. In the latter, *the whole* of the words about which our reasonings are conversant, admit, more or less, of different shades of meaning; and it is only by considering attentively the relation in which they stand to the immediate context, that the precise idea of the author in any particular instance is to be ascertained. In these sciences, accordingly, the constant and unremitting exercise of the attention is indispensibly necessary, to prevent us, at every step of our progress, from going astray.

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* Wallisii Opera, Vol. III. p. 621.

† Wallisii Opera, Vol. III. p. 633.

As these reveries of this truly great man are closely connected with the subsequent history of logical speculation in more than one country of Europe, I have been induced to incorporate them, in an English version, with my own disquisitions. Some expressions, which, I am sensible, are not altogether agreeable to the idiom of our language, might have been easily avoided, if I had not felt it incumbent on me, in translating, an author whose meaning, in this instance, I was able but very imperfectly to comprehend, to deviate as little as possible from his own words.

On this subject I have made various remarks in a volume lately published; to which I beg leave here to refer, in order to save the trouble of unnecessary repetitions.* From what I have there said, I trust it appears, that, in following any train of reasoning, beyond the circle of the mathematical sciences, the mind must necessarily carry on, along with the logical deduction expressed in words, another logical process of a far nicer and more difficult nature;—that of fixing, with a rapidity which escapes our memory, the precise sense of every word which is ambiguous, by the relation in which it stands to the general scope of the argument. In proportion as the language of science becomes more and more exact, the difficulty of this task will be gradually diminished; but let the improvement be carried to any conceivable extent, not one step will have been gained in accelerating that æra, so sanguinely anticipated by Leibnitz and Condillac, when our reasonings in morals and politics shall resemble, in their mechanical regularity, and in their demonstrative certainty, the investigations of algebra. The improvements which language receives, in consequence of the progress of knowledge, consisting rather in a more precise distinction and classification of the various meanings of words, than in a reduction of these meanings in point of number, the task of mental induction and interpretation may be rendered more easy and unerring; but the necessity of this task can never be superseded, till every word which we employ shall be as fixed and invariable in its signification, as an algebraical character, or as the name of a geometrical figure.

In the mean time, the intellectual superiority of one man above another, in all the different branches of moral and political philosophy, will be found to depend chiefly on the success with which he has cultivated these *silent habits of inductive interpretation*,—much more, in my opinion, than on his acquaintance with those rules which form the great objects of study to the professed logician. In proof of this, it is sufficient for me to remind my readers, that the whole theory of syllogism proceeds on the supposition that the same word is always to be employed precisely in the same sense, (for otherwise, the syllogism would be vitiated by consisting of more than *three terms*) and, conseqently, it takes for granted, in every rule which it furnishes for the guidance of our reasoning powers, that the nicest, and by far the most difficult part of the logical process has been previously brought to a successful termination.

In treating of a different question, I have elsewhere remarked, that although many authors have spoken of the wonderful *mechanism of speech*, none has hitherto attended to the far more wonderful *mechanism* which it puts into action behind the scene. A similar observation will be found to apply to what is commonly called the Art of Reasoning. The scholastic precepts which profess to teach

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* Philosophical Essays, p. 153, et seq. 4to. edit.

no deeper than the very surface of the subject; being all
confined to that part of the intellectual process which is
in the form of verbal propositions. On the most favoura-
sition which can be formed with respect to them, they are
us and nugatory; but, in many cases, it is to be apprehend-
hey interfere with the right conduct of the understanding,
awing the attention from the cultivation of that mental
which the soundness of our conclusions essentially depends,
e study of which (although some general rules may be of
y man must be, in a great measure, his own master.*

practical application of the foregoing conclusions, it cannot
ur, as a consideration equally obvious and important, that,
tion as the objects of our reasoning are removed from the
r details with which our senses are conversant, the difficul-
e latent inductive processes must be increased. This is
source of that incapacity for general speculation, which
e has so well described as a distinguishing characteristic of
ted minds. "General reasonings seem intricate, merely
they are general; nor is it easy for the bulk of mankind
nguish, in a great number of particulars, that common cir-
nce in which they all agree, or to extract it, pure and un-
from the other superfluous circumstances. Every judg-
r conclusion with them is particular. They cannot enlarge
iews to those universal propositions which comprehend un-
m an infinite number of individuals, and include a whole
in a single theorem. Their eye is confounded with such
nsive prospect, and the conclusions deduced from it, even
clearly expressed, seem intricate and obscure."†

lt, however, and even impossible as the task of general
on is to the bulk of mankind, it is nevertheless true, that it
h which leads the cautious and skilful reasoner to all his
ain, as well as most valuable conclusions in morals and in poli-
theorist, indeed, should expect, that these conclusions are in
rticular instance to be realized, he would totally misapprehend
re and application; in as much as they are only to be brought
erimental test, by viewing them on an extensive scale, and
g our observations during a long period of time. "When a
liberates (says Mr. Hume) concerning his conduct in any
ar affair, and forms schemes in politics, trade, economy, or
iness in life, he never ought to draw his arguments too fine,
ect too long a chain of consequences together. Something
to happen that will disconcert his reasoning, and produce
it different from what he expected. But when we reason
neral subjects, one may justly affirm, that our speculations
rcely ever be too fine, provided they be just; and that the
ce between a common man and a man of genius is chiefly

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ho are interested in this discussion, will enter more completely into my views,
the trouble to combine what is here stated with some observations I have in-
the first volume of this work.

† Essay on Commerce.

"seen in the shallowness or depth of the principles on which they "proceed." The same author afterwards excellently observes, "That general principles, however intricate they may seem must "always prevail, if they be just and sound, in the general course "of things, though they may fail in particular cases; and that it is "the chief business of philosophers to regard the general course of "things."—"I may add, (continues Mr. Hume) that it is also the "chief business of politicians, especially in the domestic govern-"ment of the state, where the public good, which is, or ought to "be, their object, depends on the concurrence of a multitude of "causes; not, as in foreign politics, on accidents and chances, and "the caprices of a few persons."*

To these profound reflections of Mr. Hume, it may be added (although the remark does not bear directly on our present argument) that, in the systematical application of general and refined rules to their private concerns, men frequently err from calculating their measures upon a scale disproportionate to the ordinary duration of human life. This is one of the many mistakes into which projectors are apt to fall; and hence the ruin which so often overtakes them, while sowing the seeds of a harvest which others are to reap. A few years more might have secured to themselves the prize which they had in view; and changed the opinion of the world (which is always regulated by the accidental circumstances of failure or of success) from contempt of their folly, into admiration of their sagacity and perseverance.

It is observed by the Comte de Bussi, that "time remedies all "mischances; and that men die unfortunate, only because they did "not live long enough. Mareschal d'Estrée who died rich at a "hundred, would have died a beggar, had he lived only to eighty." The maxim, like most other apothegms, is stated in terms much too unqualified; but it may furnish matter for many interesting reflections, to those who have surveyed with attention the characters which have passed before them on the stage of life; or who amuse themselves with marking the trifling and fortuitous circumstances by which the multitude are decided, in pronouncing their verdicts of foresight or of improvidence.

IV.

Continuation of the Subject.—Peculiar and supereminent Advantages possessed by Mathematicians, in consequence of their definite Phraseology.

If the remarks contained in the foregoing articles of this section be just, it will follow, that the various artificial aids to our reasoning

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* Essay on Commerce.

This contrast between the domestic and the foreign policy of a state occurs more than once in Mr. Hume's writings; (see in particular the first paragraphs of his Essay on the Rise of Arts and Sciences.) A similar observation had long before been made by Poliby powers, which have been projected by Leibnitz and others, proceed on the supposition (a supposition which is also tacitly assumed in the syllogistic theory) that, in all the sciences the words which we employ have, in the course of our *previous* studies, been brought to a sense as unequivocal as the phraseology of mathematicians. They proceed on the supposition, therefore, that by far the most difficult part of the logical problem has been already solved. Should the period ever arrive, when the language of moralists and politicians shall be rendered as perfect as that of geometers and algebraists, *then*, indeed may such contrivances as the *Ars Combinatoria*, and the *Alphabet of human thoughts*, become interesting subjects of philosophical discussion; although the probability is, that, even were that æra to take place, they would be found nearly as useless in morals and politics, as the syllogistic art is acknowledged to be at present, in the investigations of pure geometry.

Of the peculiar and supereminent advantage possessed by mathematicians, in consequence of those fixed and definite relations which form the objects of their science, and the correspondent precision in their language and reasonings, I can think of no illustration more striking than what is afforded by Dr. Halley's Latin version from an Arabic manuscript, of the two books of Apollonius Pergaeus *de Sectione Rationis*. The extraordinary circumstances under which this version was attempted and completed (which I presume are little known beyond the narrow circle of mathematical readers) appear to me so highly curious, considered as matter of literary history, that I shall copy a short detail of them from Halley's preface.

After mentioning the accidental discovery in the Bodleian library by Dr. Bernard, Savilian Professor of astronomy, of the Arabic version of Apollonius, περι λογου αποτομης, Dr. Halley proceeds thus:

"Delighted, therefore, with the discovery of such a treasure, "Bernard applied himself diligently to the task of a Latin transla- "tion. But before he had finished a tenth part of his undertaking, "he abandoned it altogether, either from his experience of its "growing difficulties, or from the pressure, of other avocations. "Afterwards, when, on the Death of Dr. Wallis, the Savilian pro- "fessorship was bestowed on me, I was seized with a strong de- "sire of making a trial to complete what Bernard had begun;— "an attempt, of the boldness of which the reader may judge, when "he is informed, that, in addition to my own entire ignorance of "the Arabic language, I had to contend with the obscurities occa- "sioned by innumerable passages which were either defaced or alto- "gether obliterated. With the assistance, however, of the sheets "which Bernard had left, and which served me as a key for in- "vestigating the sense of the original, I began first with making a

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us. "There are two ways by which every kind of government is destroyed: either by some accident that happens from without; or some evil that arises within itself. What the first will be, it is not always easy to foresee; but *the latter is certain and determinate.*"—Book VI. Ex. 3. (Hampton's Translation.)

"list of those words, the signification of which his version had "clearly ascertained; and then proceeded, by comparing these "words, wherever they occurred, with the train of reasoning in "which they were involved, to decypher, by slow degrees, the "import of the context; till at last I succeeded in mastering the "whole work, and in bringing my translation (without the aid of "any other person) to the form in which I now give it to the "public."*

When a similar attempt shall be made with equal success, in decyphering a moral or a political treatise written in an unknown tongue, *then*, and not till *then*, may we think of comparing the phraseology of these two sciences with the simple and rigorous language of the Greek geometers; or with the more refined and abstract, but not less scrupulously logical system of *signs*, employed by modern mathematicians.

It must not, however, be imagined, that it is solely by the nature of the ideas which form the objects of its reasonings, even when combined with the precision and unambiguity of its phraseology, that mathematics is distinguished from the other branches of our knowledge. The *truths* about which it is conversant, are of an order altogether peculiar and singular; and the *evidence* of which they admit resembles nothing, either in degree or in kind, to which the same name is given, in any of our other intellectual pursuits. On these points also, Leibnitz and many other great men have adopted very incorrect opinions; and, by the authority of their names, have given currency to some logical errours of fundamental importance. My reasons for so thinking, I shall state as clearly and fully as I can, in the following section.

SECTION III.

OF MATHEMATICAL DEMONSTRATION.

I.

Of the Circumstance on which Demonstrative Evidence essentially depends.

The peculiarity of that species of evidence which is called demonstrative, and which so remarkably distinguishes our mathematical conclusions from those to which we are led in other branches of science, is a fact which must have arrested the attention of every person who possesses the slightest acquaintance with the elements of geometry. And yet I am doubtful if a satisfactory account has been hitherto given of the circumstances from which it arises. Mr. Locke tells us, that "what constitutes a demonstration is intui-

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* Apollon. Perg. de Sectione Rationis, &c. Opera et Studio Edm. Halley. Oxon. 1706. In Praefat.

"tive evidence at every step;" and I readily grant, that if in a single step such evidence should fail, the other parts of the demonstration would be of no value. It does not, however, seem to me, that it is on this consideration that the demonstrative evidence of the conclusion depends,—not even when we add to it another which is much insisted on by Dr. Reid,—that, "in demonstrative evidence, "our first principles must be intuitively certain." The inaccuracy of this remark I formerly pointed out when treating of the evidence of axioms; on which occasion I also observed, that the first principles of our reasonings in mathematics are not *axioms*, but *definitions*. It is in this last circumstance (I mean the peculiarity of reasoning from *definitions*) that the true theory of mathematical demonstration is to be found; and I shall accordingly endeavour to explain it at considerable length, and to state some of the more important consequences to which it leads.

That I may not, however, have the appearance of claiming, in behalf of the following discussion, an undue share of originality, it is necessary for me to remark, that the leading idea which it contains has been repeatedly started, and even to a certain length prosecuted, by different writers, ancient as well as modern; but that, in all of them, it has been so blended with collateral considerations, altogether foreign to the point in question, as to divert the attention both of writer and reader, from that single principle on which the solution of the problem hinges. The advantages which mathematics derives from the peculiar nature of those relations about which it is conversant; from its simple and definite phraseology; and from the severe logic so admirably displayed in the concatenation of its innumerable theorems, are indeed immense, and well entitled to a separate and ample illustration; but they do not appear to have any necessary connexion with the subject of this section. How far I am right in this opinion, my readers will be enabled to judge by the sequel.

It was already remarked, in the first chapter of this Part, that whereas, in all other sciences, the propositions which we attempt to establish, express facts real or supposed,—in mathematics, the propositions which we demonstrate only assert a connexion between certain suppositions and certain consequences. Our reasonings, therefore, in mathematics, are directed to an object essentially different from what we have in view in any other employment of our intellectual faculties; not to ascertain *truths* with respect to actual existences, but to trace the logical filiation of consequences which follow from an assumed *hypothesis*. If from this *hypothesis* we reason with correctness, nothing, it is manifest, can be wanting to complete the evidence of the result; as this result only asserts a necessary connexion between the supposition and the conclusion. In the other sciences, admitting that every ambiguity of language were removed, and that every step of our deductions were rigorously accurate, our conclusions would still be attended with more or less of uncertainty; being ultimately founded on principles which may, or may not, correspond exactly with the fact.*

Hence it appears, that it might be possible, by devising a set of arbitrary definitions, to form a science which, although conversant about moral, political, or physical ideas, should yet be as certain as geometry. It is of no moment, whether the definitions assumed correspond with facts or not, provided they do not express impossibilities, and be not inconsistent with each other. From these principles a series of consequences may be deduced by the most unexceptionable reasoning; and the results obtained will be perfectly analogous to mathematical propositions. The terms *true* and *false*, cannot be applied to them; at least in the sense in which they are applicable to propositions relative to facts. All that can be said is, that they are or are not connected with the definitions which form the principles of the science; and, therefore, if we choose to call our conclusions *true* in the one case, and *false* in the other, these epithets must be understood merely to refer to their connexion with the *data*, and not to their correspondence with things actually existing, or with events which we expect to be realized in future. An example of such a science as that which I have now been describing, occurs in what has been called by some writers *theoretical mechanics;* in which, from arbitrary hypotheses concerning physical laws, the consequences are traced which *would* follow, if such was really the order of nature.

In those branches of study which are conversant about moral and political propositions, the nearest approach which I can imagine to a hypothetical science, analogous to mathematics, is to be found in a code of municipal jurisprudence; or rather might be conceived to exist in such a code, if systematically carried into execution, agreeably to certain general or fundamental principles. Whether these principles should or should not be founded in justice and expediency, it is evidently possible, by reasoning from them consequentially, to create an artificial or conventional body of knowledge, more systematical, and, at the same time, more complete in all its parts, than, in the present state of our information, any science can be rendered, which ultimately appeals to the eternal and immutable standards of truth and falsehood, of right and wrong. This consideration seems to me to throw some light on the following very curious parallel which Leibnitz has drawn (with what justness I presume not to decide) between the works of the Roman civilians and those of the Greek geometers. Few writers certainly have been so fully qualified as he was to pronounce on the characteristical merits of both.

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* This distinction coincides with one which has been very ingeniously illustrated by M. Prevost in his philosophical essays. See his remarks on those sciences which have for their object *absolute truth*, considered in contrast with those which are occupied only about *conditional or hypothetical truths.* Mathematics is a science of the latter description; and is therefore called by M Prevost a *science of pure reasoning*. In what respects my opinion on this subject differs from his, will appear afterwards.—*Essais de Philosophie*, Tom. II. p. 9. et. seq.

"I have often said, that, after the writings of geometricians, "there exists nothing which, in point of force and of subtilty, can "be compared to the works of the Roman lawyers. And, as it "would be scarcely possible, from mere intrinsic evidence, to distinguish a demonstration of Euclid's from one of Archimedes or "of Apollonius (the style of all of them appearing no less uniform "than if reason herself was speaking through their organs,) so also "the Roman lawyers all resemble each other like twin-brothers; in"so much that, from the style alone of any particular opinion or "argument, hardly any conjecture could be formed with respect to "the author. Nor are the traces of a refined and deeply meditat"ed system of natural jurisprudence any where to be found more "visible, or in greater abundance. And, even in those cases where "its principles are departed from, either in compliance with the "language consecrated by technical forms, or in consequence of "new statutes, or of ancient traditions, the conclusions which the "assumed hypothesis renders it necessary to incorporate with the "eternal dictates of right reason, are deduced with the soundest "logic, and with an ingenuity which excites admiration. Nor are "these deviations from the law of nature so frequent as is common"ly imagined."*

I have quoted this passage merely as an illustration of the analogy already alluded to, between the systematical unity of mathematical science, and that which is *conceivable* in a system of municipal law. How far this unity is exemplified in the Roman code, I leave to be determined by more competent judges.†

As something analogous to the hypothetical or conditional conclusions of mathematics may thus be fancied to take place in speculations concerning moral or political subjects, and actually does take place in theoretical mechanics; so, on the other hand, if a mathematician should affirm of a general property of the circle, that it applies to a particular figure described on paper, he would at once degrade a geometrical theorem to the level of a fact resting ultimately on the evidence of our imperfect senses. The accuracy of his reasoning could never bestow on his proposition that peculiar evidence which is properly called *mathematical*, as long as the fact remained uncertain, whether all the straight lines drawn from the centre to the circumference of the figure were mathematically equal.

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* Leibnitz, Op. Tom. IV. p. 254.

† It is not a little curious that the same code which furnished to this very learned and philosophical jurist, the subject of the *eulogium* quoted above, should have been lately stigmatized by an English lawyer, eminently distinguished for his acuteness and originality, as "an enormous mass of confusion and inconsistency." Making all due allowances for the exaggerations of Leibnitz, it is difficult to conceive that his opinion, on a subject which he had so profoundly studied, should be so very widely at variance with the truth.

These observations lead me to remark a very common misconception concerning mathematical definitions; which are of a nature essentially different from the definitions employed in any of the other sciences. It is usual for writers on logic, after taking notice of the errors to which we are liable in consequence of the ambiguity of words, to appeal to the example of mathematicians, as a proof of the infinite advantage of using, in our reasonings, such expressions only as have been carefully defined. Various remarks to this purpose occur in the writings both of Mr. Locke and of Dr. Reid. But the example of mathematicians is by no means applicable to the sciences in which these eminent philosophers propose that it should be followed; and, indeed, if it were copied as a model in any other branch of human knowledge, it would lead to errors fully as dangerous as any which result from the imperfections of language. The real fact is, that it has been copied much more than it ought to have been, or than would have been attempted, if the peculiarities of mathematical evidence had been attentively considered.

That in mathematics, there is no such thing as an ambiguous word, and that it is to the proper use of definitions we are indebted for this advantage, must unquestionably be granted. But this is an advantage easily secured, in consequence of the very limited vocabulary of mathematicians, and the distinctness of the ideas about which their reasonings are employed. The difference, besides, in this respect, between mathematics and the other sciences, however great, is yet only a difference in degree; and is by no means sufficient to account for the essential distinction which every person must perceive between the irresistible cogency of a mathematical demonstration, and that of any other process of reasoning.

From the foregoing considerations it appears, that, in mathematics, definitions answer two purposes; first, To prevent ambiguities of language; and, secondly, To serve as the principles of our reasoning. It appears further, that it is to the latter of these circumstances (I mean to the employment of hypotheses instead of facts, as the data on which we proceed) that the peculiar force of demonstrative evidence is to be ascribed. It is however only in the *former* use of definitions, that any parallel can be drawn between mathematics and those branches of knowledge which relate to facts; and, therefore, it is not a fair argument in proof of their general utility, to appeal to the unrivalled certainty of mathematical science,—a pre-eminence which that science derives from a source altogether different, though comprehended under the same name, and which she will forever claim as her own exclusive prerogative.*

Nor ought it to be forgotten, that it is in pure mathematics alone, that definitions can be attempted with propriety at the outset of our investigations. In most other instances, some previous discusecessary to shew, that the definitions which we lay down nd with facts; and, in many cases, the formation of a just is the end to which our inquiries are directed. It is very ly observed by Mr. Burke, in his Essay on Taste, that we define, we are in danger of circumscribing nature within nds of our own notions, which we often take up by hazard, race on trust, or form out of a limited and partial consideration f the object before us, instead of extending our ideas to take hat nature comprehends, according to her manner of com- . We are limited in our inquiry by the strict laws to which e submitted at our setting out."

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* These two classes of definitions are very generally confounded by logicians; among others, by the Abbé de Condillac. See *La Logique, ou les premiers developpemens de l'Art de Penser*, Chap. VI.

me author adds, that "a definition may be very exact, and ut a very little way towards informing us of the nature of ng defined;" and that, "in the order of things, a definition s virtue be what it will) ought rather to follow than to e our inquiries, of which it ought to be considered as the "

a want of attention to these circumstances, and from a itation of the mathematical arrangement, in speculations cts are involved among the principles of our reasonings, es errors in the writings of philosophers might be easily The subject is of too great extent to be pursued any farther ut it is well entitled to the examination of all who may r thoughts to the reformation of logic. That the ideas of himself, with respect to it, were not very precise, must, I e granted, if the following statement of his ingenious comr be admitted as correct.

ry general term (says Dr. Gillies) is considered by Aris- s the abridgment of a definition; and every definition is nated by him a *collection*, because it is the result always rvation and comparison, and often of many observations many comparisons."*

two propositions will be found, upon examination, not very t with each other. The first, "That every general term abridgment of a definition," applies indeed admirably to tics; and touches with singular precision on the very cir- e which constitutes (in my opinion) the peculiar cogency matical reasoning. But it is to mathematics that it applies ely. If adopted as a logical maxim in other branches of ge, it would prove an endless source of sophistry and error. econd proposition, on the other hand, "That every defini- the result of observation and comparison, and often of many ations and many comparisons;" however applicable to the s of natural history, and of other sciences which relate to not, in one single instance, apply to the definitions of geo- in as much as these definitions are neither the result of ions nor of comparisons, but the *hypotheses*, or first princi- which the whole science rests.

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* Gillies's Aristotle, Vol. I. p. 92. 2d edit.

If the foregoing account of demonstrative evidence be just, it follows, that no chain of reasoning whatever can deserve the name of a *demonstration*, (at least in the mathematical sense of that word) which is not ultimately resolvable into hypotheses or definitions.* It has been already shown, that this is the case with geometry: and it is also manifestly the case with arithmetic, another science to which, in common with geometry, we apply the word mathematical. The simple arithmetical equations $2 + 2 = 4$; $2 + 3 = 5$, and other elementary propositions of the same sort, are (as was formerly observed) mere *definitions*;† perfectly analogous, in this respect to those at the beginning of Euclid; and it is from a few fundamental principles of this sort, or at least from principles which are essentially of the same description, that all the more complicated results in the science are derived.

To this general conclusion, with respect to the nature of mathematical demonstration, an exception may perhaps be, at first sight, apprehended to occur, in our reasonings concerning geometrical *problems*; all of these reasonings (as is well known) resting ultimately upon a particular class of principles called *postulates*, which are commonly understood to be so very nearly akin to *axioms*, that both might, without impropriety, be comprehended under the same name. "The definition of a postulate (says the learned and ingenious Dr. Hutton) will nearly agree also to an axiom, which is "a self-evident theorem, as a postulate is a self-evident problem."‡ The same author, in another part of his work, quotes a remark from Dr. Barrow, that "there is the same affinity between postulates and problems, as between axioms and theorems."§ Dr. Wallis, too, appears, from the following passage, to have had a decided leaning to this opinion: "According to some, the difference "between axioms and postulates is analogous to that between theo-"rems and problems; the former expressing truths which are self-"evident, and from which other propositions may be deduced; the "latter, operations which may be easily performed, and by the help "of which more difficult constructions may be effected." He afterwards adds, "This account of the distinction between postulates "and axioms seems not ill adapted to the division of mathematical "propositions into problems and theorems. And indeed, if both "postulates and axioms were to be comprehended under either of

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* Although the account given by Locke of what constitutes a *demonstration*, be different from that which I have here proposed, he admits the *converse* of this doctrine as manifest; viz. That if we reason accurately from our own definitions, our conclusions will possess *demonstrative evidence*; and "hence (he observes with great truth) it comes to pass, that one may often meet with very clear and coherent discourses, that amount yet to nothing." He afterwards remarks, that "one may make demonstrations and undoubted propositions in words, and yet thereby advance not one jot in the knowledge of the truth of things." "Of this sort (he adds) a man may find an infinite number of propositions, reasonings, and conclusions, in books of metaphysics, school-divinity, and some sort of natural philosophy; and, after all, know as little of God, spirits, or bodies, as he did before he set out."—*Essay on Human Understanding*, Book IV. chap. viii.

† See page 25.

‡ Mathematical Dictionary, Art. *Postulate.*

§ Ibid, Art. *Hypothesis.*

"these names, the innovation would not, in my opinion, afford much "ground for censure."*

In opposition to these very high authorities I have no hesitation to assert, that it is with the *definitions* of Euclid, and not with the *axioms*, that the *postulates* ought to be compared, in respect of their logical character and importance;—in as much as all the *demonstrations* in plane geometry are ultimately founded on the former, and all the *constructions* which it recognizes as legitimate, may be resolved ultimately into the latter. To this remark it may be added, that, according to Euclid's view of the subject, the problems of geometry are not less hypothetical and speculative than the theorems; the possibility of drawing a *mathematical* straight line, and of describing a *mathematical* circle, being assumed in the construction of every problem, in a way quite analogous to that in which the enunciation of a theorem assumes the *existence* of straight lines and of circles corresponding to their *mathematical* definitions. The reasoning, therefore, on which the solution of a problem rests, is not less *demonstrative* than that which is employed in proof of a theorem. Grant the possibility of the three operations described in the postulates, and the correctness of the solution is as mathematically certain, as the truth of any property of the triangle or of the circle. The three postulates of Euclid are, indeed, nothing more than the definitions of a circle and a straight line thrown into a form somewhat different; and a similar remark may be extended to the corresponding distribution of propositions into theorems and problems. Notwithstanding the many conveniences with which this distribution is attended, it was evidently a matter of choice rather than of necessity; all the truths of geometry easily admitting of being moulded into either shape, according to the fancy of the mathematician. As to the *axioms*, there cannot be a doubt whatever opinion may be entertained of their utility, or of their insignificance) that they stand precisely in the same relation to both classes of propositions.†

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* Wallisii Opera, Vol. II. pp. 667, 668.

† In further illustration of what is said above, on the subject of postulates and of problems, I transcribe, with pleasure, a short passage from a learned and interesting memoir, just published, by an author intimately and critically conversant with the classical remains of Greek geometry.

"The description of any geometrical line from the data by which it is defined must always be assumed as possible, and is admitted as the legitimate means of a geometrical construction: it is therefore properly regarded as a *postulate* Thus, the description of a straight line and of a circle are the postulates of plane geometry assumed by Euclid The description of the three *conic sections*, according to the definitions of them, must also be regarded as postulates; and though not formally stated like those of Euclid, are in truth admitted as such by Apollonius, and all other writers on this branch of geometry. The same principle must be extended to all superior lines.

"It is true, however, that the properties of such superior lines may be treated of, and the description of them may be assumed in the solution of problems, without an actual delineation of them.—For it must be observed, that no lines whatever, not even the straight line or circle, can be truly represented to the senses according to the strict mathematical definitions; but this by no means affects the theoretical conclusions which

II.

Continuation of the Subject.—How far it is true that all Mathematical Evidence is resolvable into Identical Propositions.

I HAD occasion to take notice, in the first section of the preceding chapter, of a theory with respect to the nature of mathematical evidence, very different from that which I have been now attempting to explain. According to this theory (originally, I believe, proposed by Leibnitz) we are taught, that all mathematical evidence ultimately resolves into the perception of identity; the innumerable variety of propositions which *have* been discovered, or which remain to be discovered in the science, being only diversified expressions of the simple formula, a = a.* A writer of great eminence, both as a mathematician and a philosopher, has lately given his sanction, in the strongest terms, to this doctrine; asserting, that all the prodigies performed by the geometrician are accomplished by the constant repetition of these words,—*the same is the same.* "Le géomètre avance de supposition en supposition. Et rétournant sa pensée sous mille formes, c'est en répétant sans cesse, *le même est le même*, qu'il opère tous ses prodiges."

As this account of mathematical evidence appears to me quite irreconcilable with the scope of the foregoing observations, it is necessary, before proceeding farther, to examine its real import and amount; and what the circumstances are from which it derives that plausibility which it has been so generally supposed to possess.†

That all mathematical evidence resolves ultimately into the perception of identity, has been considered by some as a consequence of the commonly received doctrine, which represents the axioms of Euclid as the *first principles* of all our subsequent reasonings in geometry. Upon this view of the subject I have nothing to offer, in addition to what I have already stated. The argument which I mean to combat at present is of a more subtile and refined nature; and, at the same time, involves an admixture of important truth,

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are logically deduced from such definitions. It is only when geometry is applied to practice, either in mensuration, or in the arts connected with geometrical principles, that accuracy of delineation becomes important."—See an *Account of the Life and Writings of Robert Simson*, M. D. By the Rev. William Trail, L.L.D. Published by G. and W. Nicol, London, 1812.

* It is more than probable, that this theory was suggested to Leibnitz by some very curious observations in Aristotle's *Metaphysics*, Book IV. chap. iii. and iv.

† I must here observe, in justice to my friend M. Prevost, that the two doctrines which I have represented in the above paragraph as quite irreconcilable, seem to be regarded by him as not only consistent with each other, but as little more than different modes of stating the same proposition. The remarks with which he has favoured me on this point will be found in the Appendix annexed to this volume. At present, it may suffice to mention, that none of the following reasonings apply to that particular view of the question which he has taken. Indeed, I consider the difference of opinion between us, as to the subject now under consideration, as chiefly verbal. On the subject of the preceding article, our opinions are exactly the same. See Appendix.

which contributes not a little to the specious verisimilitude of the conclusion. It is founded on this simple consideration, that the geometrical notions of *equality* and of *coincidence* are the same; and that, even in comparing together spaces of different figures, all our conclusions ultimately lean with their whole weight on the imaginary application of one triangle to another;—the object of which imaginary application is merely to *identity* the two triangles together, in every circumstance connected both with magnitude and figure.*

Of the justness of the assumption on which this argument proceeds, I do not entertain the slightest doubt. Whoever has the curiosity to examine any one theorem in the elements of plane geometry, in which different spaces are compared together, will easily perceive, that the demonstration, when traced back to its first principles, terminates in the fourth proposition of Euclid's first book: a proposition of which the proof rests entirely on a supposed application of the one triangle to the other. In the case of equal triangles which differ in figure, this expedient of ideal superposition cannot be directly and immediately employed to evince their equality; but the demonstration will nevertheless be found to rest at bottom on the same species of evidence. In illustration of this doctrine, I shall only appeal to the thirty-seventh proposition of the first book, in which it is proved that triangles on the same base, and between the same parallels, are equal; a theorem which appears, from a very simple construction, to be only a few steps removed from the fourth of the same book, in which the supposed application of the one triangle to the other, is the only medium of comparison from which their equality is inferred.

In general, it seems to be almost self-evident, that the equality of two spaces can be demonstrated only by showing, either that the one might be applied to the other, so that their boundaries should exactly coincide; or that it is possible, by a geometrical construction, to divide them into compartments, in such a manner, that the sum of parts in the one may be proved to be equal to the sum of parts in the other, upon the principle of superposition. To devise the easiest and simplest constructions for attaining this end, is the object to which the skill and invention of the geometer is chiefly directed.

Nor is it the geometer alone who reasons upon this principle. If you wish to convince a person of plain understanding, who is quite unacquainted with mathematics, of the truth of one of Euclid's theorems, it can only be done by exhibiting to his eye, operations, exactly analogous to those which the geometer presents to the understanding. A good example of this occurs in the sensible or experimental illustration which is sometimes given of the forty-seventh proposition of Euclid's first book. For this purpose, a card is cut into the form of a right angled triangle, and square pieces of card are adapted to the different sides; after which, by a simple and ingenious contrivance, the different squares are so dissected, that those of the two sides are made to cover the same space with the square of the hypothenuse. In truth, this mode of comparison by a superposition, actual or ideal, is the only test of equality which it is possible to appeal to; and it is from this (as seems from a passage in Proclus to have been the opinion of Apollonius) that, in point of logical rigour, the *definition* of geometrical equality should have been taken.* The subject is discussed at great length, and with much acuteness, as well as learning, in one of the mathematical lectures of Dr. Barrow; to which I must refer those readers who may wish to see it more fully illustrated.

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* It was probably with a view to the establishment of this doctrine, that some foreign elementary writers have lately given the name of *identical triangles* to such as agree with each other, both in sides, in angles, and in area. The differences which may exist between them in respect of place, and of relative position (differences which do not at all enter into the reasonings of the geometer) seem to have been considered as of so little account in discriminating them as separate objects of thought, that it has been concluded they only form *one and the same triangle*, in the contemplation of the logician.

This idea is very explicitly stated, more than once, by Aristotle: ἴσα ὧν το ποσον ἕν. "Those things are equal whose quantity is the same; (Met. iv. c. 16.) and still more precisely in these remarkable words, ἐν τουτοις ἡ ἰσοτης ἑνοτης; "In mathematical quantities, equality is identity." (Met. x c. 3.)

For some remarks on this last passage, see note (F.)

I am strongly inclined to suspect, that most of the writers who have maintained that all mathematical evidence resolves ultimately into the perception of identity, have had a secret reference, in their own minds, to the doctrine just stated; and that they have imposed on themselves, by using the words *identity* and *equality* as literally synonymous and convertible terms. This does not seem to be at all consistent, either in point of expression or of fact, with sound logic. When it is affirmed (for instance) that "if two straight lines "in a circle intersect each other, the rectangle contained by the "segments of the one is equal to the rectangle contained by the "segments of the other;" can it with any propriety be said, that the relation between these rectangles may be expressed by the formula a = a? Or, to take a case yet stronger, when it is affirmed, that "the area of a circle is equal to that of a triangle having the circumference for its base, and the radius for its altitude;" would it not be an obvious paralogism to infer from this proposition, that the triangle and the circle are one and the same thing? In this last instance, Dr. Barrow himself has thought it necessary, in order to reconcile the language of Archimedes with that of Euclid, to have recourse to a scholastic distinction between *actual* and *potential coincidence*; and, therefore, if we are to avail ourselves of the principle of *superposition*, in defence of the fashionable theory concerning mathematical evidence, we must, I apprehend, introduce a correspondent distinction between *actual and potential identity*.[*]

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* I do not think, however, that it would be fair, on this account, to censure Euclid for the arrangement which he has adopted, as he has thereby most ingeniously and dexterously contrived to keep out of the view of the student some very puzzling questions, to which it is not possible to give a satisfactory answer till a considerable progress has been made in the elements. When it is stated in the form of a self-evident truth, that magnitudes which coincide, or which exactly fill the same space, are equal to one another; the beginner readily yields his assent to the proposition; and this assent, without going any farther, is all that is required in any of the demonstrations of the first six books: whereas, if the proposition were converted into a definition, by saying, 'Equal magnitudes are those which coincide, or which exactly fill the same space;" the question would immediately occur, Are *no* magnitudes equal, but those to which this test of equality can be applied? Can the relation of equality not subsist between magnitudes which differ from each other in figure? In reply to this question, it would be necessary to explain the definition, by adding, That those magnitudes likewise are said to be equal, which are capable of being divided or dissected in such a manner that the parts of the one may severally coincide with the parts of the other;—a conception much too refined and complicated for the generality of students at their first outset; and which, if it were fully and clearly apprehended, would plunge them at once into the profound speculation concerning the comparison of rectilinear with curvilinear figures.

That I may not be accused, however, of misrepresenting the opinion which I am anxious to refute, I shall state it in the words of an author, who has made it the subject of a particular dissertation; and who appears to me to have done as much justice to his argument as any of its other defenders.

" (1) Omnes mathematicorum propositiones sunt identicae, et re-
" praesentantur hac formula, $a = a$. Sunt veritates identicae, sub
" varia forma expressae, imo ipsum, quod dicitur contradictionis prin-

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[*] "Cum demonstravit Archimedes circulum aequari rectangulo triangulo cujus basis radio circuli, cathetus peripheriae exaequetur, nil ille, siquis propius attendat, aliud quicquam quam aream circuli seu polygoni regularis indefinite multa latera habentis, in tot dividi posse minutissima triangula, quae totidem exilissimis dicti trianguli trigonis aequentur; eorum verò triangulorum aequalitas è sola congruentia demonstratur in elementis. Unde consequenter Archimedes circuli cum triangulo (sibi quantumvis dissimili) congruentiam demonstravit.—Ita congruentiae nihil obstat figurarum dissimilitudo; verùm seu similes sive dissimiles sint, modò aequales, semper poterunt semper posse debebunt congruere. Igitur octavum axioma vel nullo modo conversum valet, aut universaliter converti potest; nullo modo, si quae isthic habetur congruentia designet *actualem congruentiam*; universim, si de *potentiali* tantùm accipiatur."—*Lectiones Mathematicae*, Lect. V.

[When Archimedes demonstrated that a circle is equal to a right-angled triangle whose base is equal to the radius and its altitude to the periphery of the circle, he proved nothing more, if properly understood, than that the area of a circle, or of a regular polygon having an indefinite number of sides, may be divided into so many minute triangles as may be equal to as many infinitely small three-sided figures in the said triangle. But the equality of these triangles is demonstrated in the elements from their coincidence alone. Hence Archimedes proved the coincidence of the circle with the triangle, how unlike soever to itself. So the want of similitude in the figures, hinders not their coincidence; but however like or unlike, so that they be equal, they always ought and will coincide. The converse, therefore, of the eighth axiom, is either never possible, or universally; never, if the coincidence spoken of means an *actual coincidence*, or universally, if only a *potential coincidence*.]

(1) [All the propositions of Mathematicians are identical, and are expressed by this formula, $a = a$. They are identical truths, expressed under a different form; nay, the same thing which is called the beginning of the series, differently stated and involved: for in truth, all the propositions of this class are contained in it. As far as I understand it, the only difference in the propositions is, that they are reduced, some by a longer and some by a shorter method, to the first principle of all, and resolved into that. So, for instance, the proposition $2 + 2 = 4$ immediately resolves itself into this, $1 + 1 + 1 + 1 = 1 + 1 + 1 + 1$; that is, the same is the same, and in speaking with strict propriety, it ought to be so expressed. If it happen that four exist, then four exist: for geometers do not treat of existence, which is only understood hypothetically. Thence he who traces the steps of reasoning acquires the most complete certainty, for he observes the identity of the ideas. And this evidence, which we call mathematical or geometrical, immediately compels assent. Yet the nature of geometry is not peculiar and confined to that science, for it arises from the perception of identity, which may happen, though the ideas do not represent extension.]

“ cipium, vario modo enunciatum et involutum; siquidem omnes hujus
“ generis propositiones reverâ in eo continentur. Secundum nos-
“ tram autem intelligendi facultatem, ea est propositionum differen-
“ tia; quod quaedam longa ratiociniorum serie, alia autem breviore
“ via, ad primum omnium principium reducantur, et in illud resol-
“ vantur. Sic. v. g. propositio $2 + 2 = 4$ statim huc cedit $1 + 1$
“ $+ 1 + 1 = 1 + 1 + 1 + 1$; i. e. idem est idem; et proprie lo-
“ quendo, hoc modo enunciari debet.—Si contingat, adesse vel ex-
“ istere quatuor entia, tum existunt quatuor entia; nam de existen-
“ tia non agunt geometrae, sed ea hypothetice tantum subintelligi-
“ tur. Inde summa oritur certitudo ratiocinia perspicienti; obser-
“ vat nempe idearum identitatem; et haec est evidentia assensum
“ immediate cogens, quam mathematicam aut geometricam voca-
“ mus. Mathesi tamen sua natura priva non est et propria; oritur
“ etenim ex identitatis perceptione, quae locum habere potest, eti-
“ amsi ideae non repraesentent extensum.”*

With respect to this passage, I have only to remark, that the author confounds two things essentially different;—the nature of the *truths* which are the objects of a science, and the nature of the *evidence* by which these truths are established. Granting, for the sake of argument, that all mathematical propositions may be represented by the formula $a = a$, it would not therefore follow, that every step of the reasoning leading to these conclusions, was a proposition of the same nature; and that, to feel the full force of a mathematical demonstration, it is sufficient to be convinced of this maxim, that *every thing may be truly predicated of itself*; or, in plain English, that *the same is the same*. A paper written in cypher, and the interpretation of that paper by a skilful decypherer, may, in like manner, be considered as, to all intents and purposes, one and the same thing. They are so, in fact, just as much as one side of an algebraical equation is the same thing with the other. But does it therefore follow, that the whole evidence upon which the art of decyphering proceeds, resolves into the perception of identity?

It may be fairly questioned too, whether it can, with strict correctness, be said even of the simple arithmetical equation $2 + 2 = 4$, that it may be represented by the formula $a = a$. The one is a proposition asserting *the equivalence of two different expressions*;—to ascertain which equivalence may, in numberless cases, be an object of the highest importance. The other is altogether unmeaning and nugatory, and cannot, by any possible supposition, admit of the slightest application of a practical nature. What opinion then shall we form of the proposition $a = a$, when considered as the representative of such a *formula* as the binomial theorem of Sir Isaac Newton? When applied to the equation 2 + 2 = 4 (which from its extreme simplicity and familiarity, is apt to be regarded in the light of an axiom) the paradox does not appear to be so manifestly extravagant; but, in the other case, it seems quite impossible to annex to it any meaning whatever.*

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* The above extract (from a dissertation printed at Berlin in 1764, has long had a very extensive circulation in this country, in consequence of its being quoted by By Dr. Beattie, in his Essay on Truth, (see p. 221. 2d edit.) As the learned author of the essay has not given the slightest intimation of his own opinion on the subject, the doctrine in question has, I suspect, been considered as in some measure sanctioned by his authority. It is only in this way that I can account for the facility with which it has been admitted by so many of our northern logicians.

I should scarcely have been induced to dwell so long on this theory of Leibnitz concerning mathematical evidence, if I had not observed among some late logicians (particularly among the followers of Condillac) a growing disposition to extend it to all the different sorts of evidence resulting from the various employments of our reasoning powers. Condillac himself states his own opinion on this point with the most perfect confidence. (1) "*L'évidence de raison* " *consiste uniquement dans l'identité:* c'est ce que nous avons dé- " montré. Il faut que cette vérité soit bien simple pour avoir " échappé à tous les philosophes, quoiqu' ils eussent tant d'intérêt " à s'assurer de l'évidence, dont ils avoient continuellement le mot " dans la bouche."†

* The foregoing reasonings are not meant as a refutation of the arguments urged by any one author in support of the doctrine in question; but merely as an examination of those by which I have either heard it defended, or from which I conceived that it might possibly derive its verisimilitude in the judgment of those who have adopted it. The arguments which I have *supposed* to be alleged by its advocates, are so completely independent of each other, that, instead of being regarded as different premises leading to the same conclusion, they amount only to so many different interpretations of the same verbal proposition;—a circumstance which, I cannot help thinking, affords of itself no slight proof, that this proposition has been commonly stated in terms too general and too ambiguous for a logical principle. What a strange inference has been drawn from it by no less a philosopher than Diderot! "Interrogez des " mathématiciens de bonne foi, et ils vous avoueront que leurs propositions sont toutes " identiques, et que tant de volumes sur le cercle, par exemple, se réduisent à " nous répéter en cent mille facons différentes, que c'est une figure ou toutes les lignes " tirées du centre à la circonférence sont égales. *Nous ne savons donc presque rien.*" —Lettre sur les Aveugles.

[Interrogate mathematicians who are honest, and they will confess that all their propositions are identical, and that so many volumes upon the circle, for example, are made up by repeating a hundred thousand times, that it is a figure in which all the lines drawn from the centre to the circumference are equal. *We know then almost nothing.*]

† La Logique, Chap. IX.

On another occasion, Condillac expresses himself thus: "Tout le systême des connois- " sances humaines peut être rendu par une expression plus abrégée et tout-a-fait iden- " tique: *les sensations sont des sensations.* Si nous pouvions, dans toutes les sciences, " suivre également la génération des idées, et saisir le vrai systême des choses, nous " verrions d'une vérité naitre toutes les autres, et nous trouverions l'expression abrégée " de tout ce que nous saurions, dans cette proposition identique: *le même est le même.*

[The whole system of human knowledge may perhaps be characterised by an expression very concise and entirely identical: *Sensations are sensations.* If we could, in all the sciences, equally follow the generation of ideas, and seize upon the true system of things, we should discover, that from one truth spring all the others, and we should find a short expression of all our knowledge in this identical proposition; *the same is the same.*]

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(1) [The evidence of reason consists entirely in identity. This we have demonstrated. The extreme simplicity of this truth has occasioned it to be overlooked by Philosophers, although they are so highly interested in this evidence, of which they continually treat.]

The *demonstration* here alluded to is extremely concise; and if we grant the two *data* on which it proceeds, must be universally acknowledged to be irresistible. The first is, "That the evidence "of every mathematical *equation* is that of identity:" The second, "That what are called, in the other sciences, *propositions* or *judg*"*ments*, are, at bottom, precisely of the same nature with *equa*"*tions*."—But it is proper, on this occasion, to let our author speak for himself.

"Mais, dira-t-on, c'est ainsi qu'on raisonne en mathématiques, ou "le raisonnement se fait avec des équations. En sera-t-il de même "dans les autres sciences, où le raisonnement se fait avec des pro"positions? Je réponds qu' *équations*, *propositions*, *jugemens*, sont "au fond la même chose, et que par conséquent on raisonne de la "même manière dans toutes les sciences."*

Upon this demonstration I have no comment to offer. The truth of the first assumption has been already examined at sufficient length; and the second (which is only Locke's very erroneous account of *judgment*, stated in terms incomparably more exceptionable) is too puerile to admit of refutation. It is melancholy to reflect, that a writer who, in his earlier years, had so admirably unfolded the mighty influence of language upon our speculative conclusions, should have left behind him, in one of his latest publications, so memorable an illustration of his own favourite doctrine.

It was manifestly with a view to the more complete establishment of the same theory, that Condillac undertook a work, which has appeared since his death, under the title of *La Language des Calculs*; and which, we are told by the editors, was only meant as a prelude to other labours, more interesting and more difficult. From the circumstances which they have stated, it would seem that the intention of the author was to extend to all the other branches of knowledge, inferences similar to those which he has here endeavoured to establish with respect to mathematical *calculations*; and much regret is expressed by his friends, that he had not lived to accomplish a design of such incalculable importance to human happiness. I believe I may safely venture to assert, that it was fortunate for his reputation he proceeded no farther; as the sequel must, from the nature of the subject, have afforded, to every competent judge, an experimental and palpable proof of the vagueness and fallaciousness of those views by which the undertaking was suggested. In his posthumous volume, the mathematical precision and perspicuity of his details appear to a superficial reader to re-lect some part of their own light on the general reasonings with which they are blended; while, to better judges, these reasonings come recommended with many advantages and with much additional authority, from their coincidence with the doctrines of the Leibnitzian school.

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* [But, some will say, It is thus we reason in mathematics where the reasoning is carried on by equations. Will it be the same in other sciences, where this is carried on by propositions? I answer, that equations, propositions, judgments, are in fact the same thing; and consequently we reason in the same manner in all the sciences.] *La Logique*, Chap. VIII.

It would probably have been not a little mortifying to this most ingenious and respectable philosopher, to have discovered, that, in attempting to generalize a very celebrated theory of Leibnitz, he had stumbled upon an obsolete conceit, started in this island upwards of a century before. “When a man reasoneth (says Hobbes) “he does nothing else but conceive a sum total, from addition of “parcels; or conceive a remainder from subtraction of one sum “from another; which (if it be done by words) is conceiving of the “consequence of the names of all the parts, to the name of the “whole; or from the names of the whole and one part, to the “name of the other part.—These operations are not incident to “numbers only, but to all manner of things that can be added together, and taken one out of another.—In sum, in what matter “soever there is place for addition and substraction, there also is “place for reason; and where these have no place, there reason “has nothing at all to do.

“Out of all which we may define what that is which is meant by “the word *reason*, when we reckon it amongst the faculties of the “mind. For *reason*, in this sense, is nothing but *reckoning* (that is, “adding and subtracting) of the consequences of general names “agreed upon, for the *marking* and *signifying* of our thoughts;—“I say *marking* them, when we reckon by ourselves; and *signifying*, “when we demonstrate, or approve our reckonings to other “men.”*

Agreeably to this definition, Hobbes has given to the first part of his elements of philosophy, the title of COMPUTATIO, sive LOGICA; evidently employing these two words as precisely synonymous. From this tract I shall quote a short paragraph, not certainly on account of its intrinsic value, but in consequence of the interest which it derives from its coincidence with the speculations of some of our contemporaries. I transcribe it from the Latin edition, as the antiquated English of the author is apt to puzzle readers not familiarized to the peculiarities of his philosophical diction.

“(1) Per ratiocinationem autem intelligo computationem. Computare vero est *plurium rerum simul additarum summam colligere, vel* “*unâ re ab aliâ detractâ, cognoscere residuum.* Ratiocinari igitur

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* Leviathan, Chap. v.

(1) [By reasoning I understand computation. To compute is to collect the sum of several things added together; or, having taken one thing from another to ascertain the residuum. To reason therefore is the same as to *add* and *subtract*; or if any one chooses to say also, to *multiply* and *divide*, I will not object, since *multiplication* is the same as the *addition* of equals, and *division* the *subtraction* of equals carried as far as possible. All reasoning therefore is reduced to two operations of the mind, *addition* and *subtraction*.]

"idem est quod *addere* et *subtrahere*, vel si quis adjungat his *multiplicare* et *dividere*, non abnuam, cum *multiplicatio* idem sit quod aequalium *additio*, *divisio* quod aequalium quoties fieri potest *subtractio*. Recidit itaque ratiocinatio omnis ad duas operationes animi, *additionem subtractionem*."* How wonderfully does this jargon agree with the assertion of Condillac, that all equations are propositions, and all propositions equations!

These speculations, however, of Condillac and of Hobbes relate to reasoning in general; and it is with mathematical reasoning alone, that we are immediately concerned at present. That the peculiar evidence with which *this* is accompanied is not resolvable into the perception of identity, has, I flatter myself, been sufficiently proved in the beginning of this article; and the plausible extension, by Condillac, of the very same theory to our reasonings in all the different branches of moral science, affords a strong additional presumption in favour of our conclusion.

From this long digression, into which I have been insensibly led by the errours of some illustrious foreigners concerning the nature of mathematical demonstration, I now return to a further examination of the distinction between sciences which rest ultimately on facts, and those in which *definitions* or *hypotheses* are the sole principles of our reasonings.

III.

Continuation of the Subject.—Evidence of the Mechanical Philosophy, not to be confounded with that which is properly called Demonstrative or Mathematical.—Opposite Errour of some late Writers.

Next to geometry and arithmetic, in point of evidence and certainty, is that branch of general physics which is now called mechanical philosophy;— a science in which the progress of discovery has been astonishingly rapid, during the course of the last century; and which, in the systematical concatenation and filiation of its elementary principles, exhibits every day more and more of that logical simplicity and elegance which we admire in the works of the Greek mathematicians. It may, I think, be fairly questioned, whether, in this department of knowledge, the affectation of mathematical method has not been already carried to an excess; the essential distinction between mechanical and mathematical truths being, in many of the physical systems which have lately appeared on the conti-

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* The *Logica* of Hobbes has been lately translated into French, under the title of *Calcul ou Logique*, by M. Destutt-Tracy. It is annexed to the third volume of his *Elémens d' Ideologie*, where it is honoured with the highest eulogies by the ingenious translator. "L'ouvrage en masse (he observes in one passage) mérite d'être regardé comme un produit precieux des méditations de Bacon et de Descartes sur le systême d'Aristote, et comme le germe des progrès ultérieures de la science." (*Disc. Prél.* p. 117.)

[The whole work merits to be esteemed as the precious product of the meditations of Bacon and Descartes upon the system of Aristotle, and as the germ of further progress in science.]

tudiously kept out of the reader's view, by exhibiting both, as
as possible, in the same form. A variety of circumstances,
, conspire to identify in the imagination, and, of consequence,
milate in the mode of their statement, these two very differ-
sses of propositions ; but as this assimilation (beside its obvi-
ndency to involve experimental facts in metaphysical mystery)
occasionally to lead to very erroneous logical conclusions, it
es the more necessary, in proportion as it arises from a *natu-*
as, to point out the causes in which it has originated, and the
tions which it ought to be understood.

e following slight remarks will sufficiently explain my gene-
eas on this important article of logic.

As the study of the mechanical philosophy is, in a great mea-
inaccessible to those who have not received a regular mathe-
al education, it commonly happens, that a taste for it is, in the
stance, grafted on a previous attachment to the researches of
or abstract mathematics. Hence a natural and insensible
erence to physical pursuits, of mathematical habits of think-
and hence an almost unavoidable propensity to give to the
r science, that systematical connexion in all its various con-
ns, which, from the nature of its first principles, is essential to
tter, but which can never belong to any science which has its
ations laid in facts collected from experience and observa-

Another circumstance, which has co-operated powerfully with
rmer in producing the same effect, is that proneness to simpli-
n which has misled the mind, more or less, in all its research-
nd which, in natural philosophy, is peculiarly encouraged by
beautiful analogies which are observable among different
cal phenomena ;—analogies, at the same time, which, however
ing to the fancy, cannot always be resolved by our reason into
general law. In a remarkable analogy, for example, which
nts itself between the equality of action and re-action in the
ion of bodies, and what obtains in their mutual attractions, the
idence is so perfect, as to enable us to comprehend all the
us facts in the same theorem ; and it is difficult to resist the temp-
n which this theorem seems to offer to our ingenuity, of attempting
ce it, in both cases, to some common principle. Such trials
eoretical skill I would not be understood to censure indiscrimi-
y; but, in the present instance, I am fully persuaded, that it
once more unexceptionable in point of sound logic, and more
actory to the learner ,to establish the fact, in particular cases.
appeal to experiment ; and to state the law of action and re-
n in the collision of bodies, as well as that which regulates the
al tendencies of bodies towards each other, merely as general
which have been obtained by induction, and which are found to
invariably, as far as our knowledge of nature extends.*

: is observed by Mr. Robison, in his Elements of Mechanical Philosophy, that "Sir
Newton, in the general scholium on the laws of motion, seems to consider the equali-

An additional example may be useful for the illustration of the same subject. It is well known to be a general principle in mechanics, that when, by means of any machine, two heavy bodies counterpoise each other, and are then made to move together, the quantities of motion with which one descends, and the other ascends perpendicularly, are equal. This equilibrium bears such a resemblance to the case of two moving bodies stopping each other, when they meet together with equal quantities of motion, that, in the opinion of many writers, the cause of an equilibrium in the several machines is sufficiently explained, by remarking, "that a body always loses as much motion as it communicates." Hence it is inferred, that when two heavy bodies are so circumstanced, that one cannot descend without causing the other to ascend at the same time, and with the same quantity of motion, both of these bodies must necessarily continue at rest. But this reasoning, however plausible it may seem to be at first sight, is by no means satisfactory; for (as Dr. Hamilton has justly observed*) when we say, that one body *communicates* its motion to another, we must suppose the motion to exist, *first* in the one, and *afterwards* in the other; whereas, in the case of the machine, the ascent of the one body cannot, by any conceivable refinement, be ascribed to a communication of motion from the body which is descending at the same moment; and, therefore, (admitting the truth of the general law which obtains in

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ty of action and re-action, as an axiom deduced from the relations of ideas. *But this* (says Mr. Robison) *seems doubtful.* Because a magnet causes the iron to approach towards it, it does not appear that we *necessarily* supposed that iron also attracts the magnet." In confirmation of this he remarks, that notwithstanding the previous conclusions of Wallis, Wren, and Huyghens, about the mutual, equal, and contrary action of solid bodies in their collisions, "Newton himself only *presumed* that, because the sun attracted the planets, these also attracted the sun; and that he is at much pains to point out phenomena to astronomers, by which this may be proved, when the art of observation shall be sufficiently perfected." Accordingly, Mr. Robison, with great propriety, contents himself with stating this third law of motion, as a fact "with respect to all bodies, on which we can make experiment or observation fit for deciding the question."

In the very next paragraph, however, he proceeds thus: "As it is an universal law, we cannot rid ourselves of the persuasion that it depends on some general principle which influences all the matter in the universe;"—to which observation he subjoins a conjecture or hypothesis concerning the nature of this principle or cause. For an outline of his theory I must refer to his own statement. (See *Elements of Mechanical Philosophy*, Vol. I. pp. 124. 125. 126.

Of the fallaciousness of synthetical reasonings concerning physical phenomena, there cannot be a stronger proof, than the diversity of opinion among the most eminent philosophers with respect to the species of evidence on which the third law of motion rests. On this point, a direct opposition may be remarked in the views of Sir Isaac Newton, and of his illustrious friend and commentator, Mr. Maclaurin; the former seeming to lean to the supposition, that it is a corollary deducible *a priori* from abstract principles; while the latter (manifestly considering it as the effect of an arbitrary arrangement) strongly recommends it to the attention of those who delight in the investigation of final causes.† My own idea is, that, in the present state of our knowledge, it is at once more safe and more logical, to consider it merely as an experimental truth; without venturing to decide positively on either side of the question. As to the doctrine of final causes, it fortunately stands in need of no aid from such dubious speculations.

* See Philosophical Essays, by Hugh Hamilton, D. D. Professor of Philosophy in the University of Dublin, p. 135, et. seq. 3d. edit. (London,) 1772.

† Account of Newton's Philosophical Discoveries. Book II, Chap. 2. § 28.

collision of bodies) we might suppose, that in the machine, the :riour weight of the heavier body would overcome the lighter, cause it to move upwards with the same quantity of motion with ch itself moves downwards. In perusing a pretended demon- tion of this sort, a student is dissatisfied and puzzled ; not from difficulty of the subject, which is obvious to every capacity, but a the illogical and inconclusive reasoning to which his assent is ired.*

. To these remarks it may be added, that even when one pro- tion in natural philosophy is logically deducible from another, ay frequently be expedient, in communicating the elements of science, to illustrate and confirm the consequence, as well as principle, by experiment. This I should apprehend to be pro- , wherever a consequence is inferred from a principle less famil- and intelligible than itself; a thing which must occasionally pen in physics, from the complete incorporation (if I may use expression) which, in modern times, has taken place between sical truths and the discoveries of mathematicians. The neces- r effect of this incorporation was, to give to natural philosophy athematical form, and to systematize its conclusions, as far as sible, agreeably to rules suggested by mathematical method.

a pure mathematics, where the truths which we investigate are :o-existent in point of time, it is universally allowed, that one position *is said* to be a consequence of another, only with a refer- e to our established arrangements. Thus all the properties of circle might be as rigorously deduced from any one general perty of the curve, as from the equality of the radii. But it s not therefore follow, that all these arrangements would be ally convenient: on the contrary, it is evidently useful, and eed necessary, to lead the mind, as far as the thing is practica- , from what is simple to what is more complex. The misfor- e is, that it seems impossible to carry this rule universally into cution : and, accordingly in the most elegant geometrical trea- s which have yet appeared, instances occur, in which conse- nces are deduced from principles more complicated than them- res. Such inversions, however, of what may justly be regarded he natural order, must always be felt by the author as a subject regret ; and, in proportion to their frequency, they detract both n the beauty, and from the didactic simplicity of his general ign.

The following observation of Dr. Hamilton places this question in its true point of . "However, as the theorem above mentioned is a very elegant one, it ought cer- y to be taken notice of in every treatise of mechanics, and may serve as a very good in- f an *equilibrium* in all machines ; but I do not think that we can from thence, or from one general principle, explain the nature and effects of all the mechanic powers in a factory manner."

o the same purpose, it is remarked by Mr. Maclaurin, that "though it be useful and able, to observe how uniformly this principle prevails in engines of every sort, through- he whole of mechanics in all cases where an *equilibrium* takes place ; yet that it would e right to rest the evidence of so important a doctrine upon a proof of this kind only." *unt of Newton's Discoveries*, B. II. c. 3.

The same thing often happens in the elementary doctrines of natural philosophy. A very obvious example occurs in the different demonstrations given by writers on mechanics, from the resolution of forces, of the fundamental proposition concerning the lever;—demonstrations in which the proposition, even in the simple case when the directions of the forces are supposed to be parallel, is inferred from a process of reasoning involving one of the most refined principles employed in the mechanical philosophy. I do not object to this arrangement as illogical; nor do I presume to say that it is injudicious.* I would only suggest the propriety, in such instances, of confirming and illustrating the conclusion, by an appeal to experiment; an appeal which, in natural philosophy, possesses an authority equal to that which is generally, but very improperly, considered as a mathematical demonstration of physical truths. In pure geometry, no reference to the senses can be admitted, but in the way of illustration; and any such reference, in the most trifling step of a demonstration, vitiates the whole. But, in natural philosophy, all our reasonings must be grounded on principles for which no evidence but that of sense can be obtained; and the propositions which we establish, differ from each other only as they are deduced from such principles immediately, or by the intervention of a mathematical demonstration. An experimental proof, therefore, of any particular physical truth, when it can be conveniently obtained, although it may not always be the most elegant or the most expedient way of introducing it to the knowledge of the student, is as rigorous and as satisfactory as any other; for the intervention of a process of mathematical reasoning can never bestow in our conclusions a greater degree of certainty than our principles possessed.*

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* In *some* of these demonstrations, however, there is a logical inconsistency so glaring, that I cannot resist the temptation of pointing it out here, as a good instance of that undue predilection for mathematical evidence, in the exposition of physical principles, which is conspicuous in many elementary treatises. I allude to those *demonstrations* of the property of the lever, in which, after attempting to prove the general theorem, *on the* supposition that the directions of the forces meet in a point, the same conclusion is extended to the simple case in which these directions are parallel, by the *fiction* (for it deserves no other name) of conceiving parallel lines to meet at an infinite distance, or to form with each other an angle infinitely small. It is strange, that such a proof should ever have been thought more satisfactory than the direct evidence of our senses. How much more reasonable and pleasing to begin with the simpler case (which may be easily brought to the test of experiment,) and then to deduce from it, by the resolution of forces, the general proposition! Even Dr. Hamilton himself, who has treated of the mechanical powers with much ingenuity, seems to have imagined, that by demonstrating the theorem, in all its cases, from the composition and resolution of forces alone, he had brought the whole subject within the compass of pure geometry. It could scarcely, however, (one should think) have escaped him, that every valid demonstration of the composition of forces must necessarily assume as *a fact*, that "when a body is acted upon by a force parallel to a straight line given in position, this force has no effect either to accelerate or to retard the progress of the body towards that line." Is not this fact much farther removed from common observation than the fundamental property of the lever, which is familiar to every peasant, and even to every savage? And yet the same author objects to the demonstration of Huyghens, that it depends upon a principle, *which* (he says) *ought not to be granted on this occasion*,—that "when two equal bodies are placed on the arms of a lever, that which is furthest from the *fulcrum* will preponderate."

I have been led to enlarge on these topics by that unqualified application of mathematical method of physics, which has been fashionable for many years past among foreign writers; and which seems to have originated chiefly in the commanding influence which the genius and learning of Leibnitz have so long maintained over the scientific taste of most European nations.† In an account lately published of the Life and Writings of Dr. Reid, I have taken notice of some other inconveniences resulting from it; still more important than the introduction of an unsound logic into the elements of natural philosophy; in particular, of the obvious tendency which it has to withdraw the attention from that unity of design which it is the noblest employment of philosophy to illustrate, by disguising it under the semblance of an eternal and necessary order, similar to what the mathematician delights to trace among the mutual relations of quantities and figures. The consequence has been, (in too many physical systems,) to level the study of nature, in point of moral interest, with the investigations of the algebraist;—an effect, too, which has taken place most remarkably, where, from the sublimity of the subject, it was least to be expected,—in the application of the mechanical philosophy to the phenomena of the heavens. But on this very extensive and important topic I must not enter at present.

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* Several of the foregoing remarks were suggested by certain peculiarities of opinion relative to the distinct provinces of experimental and of mathematical evidence in the study of physics, which were entertained by my learned and excellent friend, the late Mr. Robison. Though himself a most enlightened and zealous advocate for the doctrine of final causes, he is well known to have formed his scientific taste chiefly upon the mechanical philosophers of the continent, and, in consequence of this circumstance, to have undervalued *experiment*, wherever a possibility offered of introducing mathematical, or even metaphysical reasoning. Of this bias various traces occur, both in his Elements of Mechanical Philosophy, and in the valuable articles which he furnished to the Encyclopædia Britannica.

† The following very extraordinary passage occurs in a letter from Leibnitz to Mr. Oldenburg:

"Ego id agere constitui, ubi primum otium nactus ero, ut rem omnem mechanicam reducam ad puram geometriam; problemataque circa elateria, et aquas, et pendula, et projecta, et solidorum resistentiam, et frictiones, &c. definiam. Quae hactenus attigit nemo. Credo autem rem omnem nunc esse in potestate; ex quo circa regulas motuum mihi penitus perfectis demonstrationibus satisfeci; neque quicquam amplius in eo genere desidero. Tota autem res, quod mireris, pendet ex axiomate metaphysico pulcherrimo, quod non minoris momenti est circa motum, quam hoc, totum esse majus parte, circa magnitudinem."‡ (*Wallisii Opera*, Vol. III. p. 633.)

The *beautiful metaphysical axiom* here referred to by Leibnitz, is plainly the principle of the *sufficient reason*; and it is not a little remarkable, that the highest praise which he had to bestow upon it was, to compare it to Euclid's axiom, "That the whole is greater than its part." Upon this principle of *the sufficient reason*, Leibnitz, as is well known, conceived that a complete system of physical science might be built, as he thought the whole of mathematical science resolvable into the principles of identity and of contradiction.—By the first of these principles (it may not be altogether superfluous to add) is to be understood the maxim, "Whatever is, is;" by the second, the maxim, that "It is impossible for the same thing to be, and not to be;"—two maxims which, it is evident, are only different expressions of the same proposition.

In the remarks made by Locke on the logical inutility of *mathematical* axioms, and on the logical danger of assuming *metaphysical* axioms as the principles of our reasonings in other sciences, I think it highly probable, that he had a secret reference to the philosophical writings and epistolary correspondence of Leibnitz. This appears to me to furnish a key to some of Locke's observations, the scope of which Dr. Reid professes his inability to discover. One sentence, in particular, in which he has animadverted with some severity, is, in my opinion, distinctly pointed at the letter to Mr. Oldenburg, quoted in the beginning of this note.

"Mr. Locke farther says (I borrow Dr. Reid's own statement) that maxims are not of use to help men forward in the advancement of the sciences, or new discoveries of yet unknown truths: that Newton, in the discoveries he has made in his never enough to be

‡ [I have determined, at my earliest leisure, to reduce the whole science of mechanics to pure geometry, and to determine the problems concerning falling bodies, the motion of fluids, the pendulum, projectiles, the resistance of solids, friction, &c. This no one has yet attempted. I believe it all now lies within my reach. I have already satisfied myself as to what relates to the laws of motion, and wish for nothing farther upon that subject. The whole, and this will surprise you, rests upon a very beautiful metaphysical axiom, of not less value as respects motion, than this, that the whole is greater than a part, as respects magnitude.]

In the opposite extreme to the errour which I have now been endeavouring to correct, is a paradox which was broached, about twenty years ago, by the late ingenious Dr. Beddoes; and which has since been adopted by some writers whose names are better entitled, on a question of this sort, to give weight to their opinions.[*] By the partisans of this new doctrine it seems to be imagined, that—so far from physics being a branch of mathematics,—mathematics, and more particularly geometry, is, in reality, only a branch of phy-

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admired book, has not been assisted by the general maxim, whatever is, is; or the whole is greater than a part, or the like."

As the letter to Oldenburg is dated in 1676, (twelve years before the publication of the Essay on Human Understanding) and as Leibnitz expresses a desire that it may be communicated to Mr. Newton, there can scarcely be a doubt that Locke had read it; and it reflects infinite honour on his sagacity, that he seems, at that early period, to have foreseen the extensive influence which the errours of this illustrious man were so long to maintain over the opinions of the learned world. The truth is, that even then he prepared a reply to some reasonings which, at the distance of a century, were to mislead, both in physics and in logic, the first philosophers in Europe.

If these conjectures be well founded, it must be acknowledged that Dr. Reid has not only failed in his defence of *maxims* against Locke's attack; but that he has totally misapprehended the aim of Locke's argument.

"I answer (says he, in the paragraph immediately following that which was quoted above,) the first use of these maxims (whatever is, is) is an identical proposition, of no use in mathematics, or in any other science. The second (that the whole is greater than a part) is often used by Newton, and by all mathematicians, and many demonstrations rest upon it. In general, Newton, as well as all other mathematicians, grounds his demonstrations of mathematical propositions upon the axioms laid down by Euclid, or upon propositions which have been before demonstrated by help of these axioms.

"But it deserves to be particularly observed, that Newton, intending in the third book of his *Principia* to give a more scientific form to the physical part of astronomy, which he had at first composed in a popular form, thought proper to follow the example of Euclid, and to lay down first, in what he calls *Regulae Philosophandi*, and in his *Phenomena*, the first principles which he assumes in his reasoning.

"Nothing, therefore, could have been more unluckily adduced by Mr. Locke to support his aversion to first principles, than the example of Sir Isaac Newton." (*Essays on the Int. Powers*, pp. 647, 648, 4to. edit.)

[*] I allude here more particularly to my learned friend, Mr. Leslie, whose high and justly merited reputation, both as a mathematician and an experimentalist, renders it indispensibly necessary for me to take notice of some fundamental logical mistakes, which he appears to me to have committed in the course of those ingenious excursions, in which he occasionally indulges himself, beyond the strict limits of his favourite studies.

sics. "The mathematical sciences (says Dr. Beddoes) are sciences "of experiment and observation, founded solely on the induction of "particular facts; as much so as mechanics, astronomy, optics, or "chemistry. In the kind of evidence there is no difference; for it "originates from perception in all these cases alike; but mathema"tical experiments are more simple, and more perfectly within the "grasp of our senses, and our perceptions of mathematical objects "are clearer."[*]

A doctrine essentially the same, though expressed in terms not quite so revolting, has been lately sanctioned by Mr. Leslie; and it is to *his* view of the argument that I mean to confine my attention at present. "The whole structure of geometry (he remarks) is "grounded on the simple comparison of triangles; and all the fun"damental theorems which relate to this comparison, derive their "evidence from the *mere* superposition of the triangles themselves; "a mode of proof which, in reality, is nothing but an ultimate ap"peal, though of the easiest and most familiar kind, to external ob"servation."[†] And, in another passage: "Geometry, like the other

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[*] Into this train of thinking, Dr. Beddoes informs us, he was first led by Mr. Horne Tooke's speculations concerning language. "In whatever study you are engaged, to leave difficulties behind is distressing: and when these difficulties occur at your very entrance upon a science, professing to be so clear and certain as geometry, your feelings become still more uncomfortable; and you are dissatisfied with your own powers of comprehension. I therefore think it due to the author of ΕΠΕΑ ΠΤΕΡΟΕΝΤΑ, to acknowledge my obligations to him for relieving me from this sort of distress For although I had often made the attempt, I could never solve certain difficulties in Euclid, till my reflections were revived and assisted by Mr. Tooke's *discoveries*." (See *Observations on the Nature of Demonstrative Evidence*, London, 1793, pp. 5, and 15.)

[†] Elements of Geometry and of Geometrical Analysis, &c. By Mr. Leslie. Edinburgh, 1809.

The assertion that *the whole* structure of geometry is founded on the comparison of triangles, is expressed in terms too unqualified. D'Alembert has mentioned another principle as not less fundamental, the measurement of angles by circular arches. "Les propositions fondamentales de géométrie peuvent être réduites à deux; la mesure des angles par les arcs de cercle, et le principe de la superposition."[‡] (*Elémens des Philosophie*, Art. *Géométrie*.) The same writer, however, justly observes, in another part of his works, that the measure of angles by circular arcs, is itself dependent on the principle of superposition; and that, consequently, however extensive and important in its application, it is entitled only to rank with what he calls *principles of a second order*. "La mesure des angles par les arcs de cercle décrit de leur sommet, est elle-même dépendante du principe de la superposition. Car quand on dit que la mesure d'un angle est l'arc circulaire décrit de sommet, on veut dire que si deux angles sont égaux, les angles décrits de leur sommet à même rayon seront égaux; vérité qui se démontre par le principe de la superposition, comme tout géometre tant soit peu initié dans cette science le sentira facilement."[||] (*Eclaircissemens sur les Elémens de Philosophie*, § IV.)

Instead, therefore, of saying, that the whole structure of geometry is grounded on the comparison of triangles, it would be more correct to say, that it is grounded on the principle of superposition.

[‡] [The fundamental propositions of Geometry may be reduced to two; the measure of angles by circular arcs, and the principle of superposition.]

[||] [The measure of angles by arcs of a circle described above them, is itself dependent upon the principle of superposition. For when we say that the measure of an angle is an arc of a circle described above, we mean to say, that if the two angles are equal, the arcs described above them with the same radius will be equal; a truth which is demonstrated by the principle of superposition, as every geometer ever so little initiated in the science, will readily perceive.]

" sciences which are not concerned about the operations of mind,
" rests ultimately on external observations. But those ultimate
" facts are so few, so distinct and obvious, that the subsequent train
" of reasoning is safely pursued to unlimited extent, without ever
" appealing *again* to the evidence of the senses."*

Before proceeding to make any remarks on this theory, it is proper to premise, that it involves two separate considerations, which it is of material consequence to distinguish from each other. The first is, that extension and figure (the subjects of geometry) are qualities of body which are made known to us by our external senses alone, and which actually fall under the consideration of the natural philosopher, as well as of the mathematician. The second, that the whole fabric of geometrical science rests on the comparison of triangles, in forming which comparison, we are ultimately obliged to appeal (in the same manner as in establishing the first principles of physics) to a sensible and experimental proof.

1. In answer to the first of these allegations, it might perhaps be sufficient to observe, that in order to identify two sciences, it is not enough to state, that they are both conversant about the same objects; it is not necessary farther to show, that, in both cases, these objects are considered in the same point of view, and give employment to the same faculties of the mind. The poet, the painter, the gardener, and the botanist, are all occupied in various degrees and modes, with the study of the vegetable kingdom: yet who has ever thought of confounding their several pursuits under one common name? The natural historian, the civil historian, the moralist, the logician, the dramatist, and the statesman, are all engaged in the study of man, and of the principles of human nature; yet how widely discriminated are these various departments of science and of art! how different are the kinds of evidence on which they respectively rest! how different the intellectual habits which they have a tendency to form! Indeed, if this mode of generalization were to be admitted as legitimate, it would lead us to blend all the objects of science into one and the same mass; in as much as it is by the same impressions on our external senses, that our intellectual faculties are, in the first instance, roused to action, and all the first elements of our knowledge unfolded.

In the instance, however, before us, there is a very remarkable specialty, or rather singularity, which renders the attempt to identify the objects of geometrical and of physical science, incomparably more illogical than it would be to classify poetry with botany, or the natural history of man with the political history of nations. This specialty arises from certain peculiarities in the metaphysical nature of those *sensible qualities* which fall under the consideration of the geometer; and which led me, in a different work, to distinguish them from other sensible qualities (both primary and seconda-

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* Elements of Geometry and of Geometrical Analysis, p. 453.

,) by bestowing on them the title of *mathematical affections of* tter.* Of these mathematical affections (*magnitude* and *figure*,) r first notions are, no doubt, derived (as well as of hardness, soft- s, roughness, and smoothness) from the exercise of our external ses; but it is equally certain, that when the notions of magnitude d figure have once been acquired, the mind is immediately led to sider them as attributes of space no less than of body; and (ab- acting entirely from the other sensible qualities perceived in con- ction with them,) becomes impressed with an irresistible convic- n, that their existence is necessary and eternal, and that it would main unchanged if all the bodies in the universe were annihilated. is not our business here to inquire into the origin and grounds of is conviction. It is with the *fact* alone that we are concerned present; and this I conceive to be one of the most obviously in- ntrovertible which the circle of our knowledge embraces. Let se explain as they best can, who are of opinion, that all the judg- nts of the human understanding rest ultimately on observation d experience.

Nor is this the only case in which the mind forms conclusions con- ning space, to which those of the natural philosopher do not bear remotest analogy. Is it from experience we learn that space is nite? or (to express myself in more unexceptionable terms,) that limits can be assigned to its immensity? Here is a fact, extend- not only beyond the reach of our personal observation, but be- nd the observation of all created beings; and a fact on which we nounce with no less confidence, when in imagination we trans- rt ourselves to the utmost verge of the material universe, than en we confine our thoughts to those regions of the globe which ve been explored by travellers. How unlike those general laws ich we investigate in physics, and which, how far soever we may d them to reach, may still, for any thing we are able to discover the contrary, be only contingent, local, and temporary!

It must indeed be owned, with respect to the conclusions hither- mentioned on the subject of space, that they are rather of a me- physical than a mathematical nature; but they are not, on that ac- unt the less applicable to our purpose; for if the theory of Bed- es had any foundation, it would lead us to identify with physics the mer of these sciences as well as the latter; at least, all that part the former which is employed about space, or extension,—a fa- urite object of metaphysical as well as of mathematical specula- n. The truth, however, is, that some of our metaphysical conclu- ns concerning space are more nearly allied to geometrical theo- ms than we might be disposed at first to apprehend; being involv- or implied in the most simple and fundamental propositions which cur in Euclid's Elements. When it is asserted, for example, that f one straight line falls on two other straight lines, so as to make the two interior angles on the same side together equal to two

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* Philosophical Essays, pp. 94, 95. 4to edit.

"right angles, these two straight lines, though indefinitely produced, will never meet:"—is not the boundless immensity of space tacitly assumed as a thing unquestionable? And is not a universal affirmation made with respect to a fact which experience is equally incompetent to disprove or to confirm? In like manner, when it is said, that "triangles on the same base, and between the same parallels are equal," do we feel ourselves the less ready to give our assent to the demonstration, if it should be supposed, that the one triangle is confined within the limits of the paper before us, and that the other, standing on the same base, has its vertex placed beyond the sphere of the fixed stars? In various instances, we are led, with a force equally imperious, to acquiesce in conclusions, which not only admit of no illustration or proof from the perceptions of sense, but which, at first sight, are apt to stagger and confound the faculty of imagination. It is sufficient to mention, as examples of this, the relation between the hyperbola and it asymptotes; and the still more obvious truth of the infinite divisibility of extension. What analogy is there between such propositions as these, and that which announces, that the mercury in the Torricellian tube will fall if carried up to the top of a mountain; or that the vibrations of a pendulum of a given length will be performed in the same time, while it remains in the same latitude? Were there, in reality, that analogy between mathematical and physical propositions, which Beddoes and his followers have fancied, the equality of the square of the hypothenuse of a right angled triangle to the squares described on the two other sides, and the proportion of 1, 2, 3, between the cone and its circumscribed hemisphere and cylinder, might, with fully as great propriety, be considered in the light of physical phenomena, as of geometrical theorems: Nor would it have been at all inconsistent with the logical unity of his work, if Mr. Leslie had annexed to his Elements of Geometry, a scholium concerning the final causes of circles and of straight lines, similar to that which, with such sublime effect, closes the Principia of Sir Isaac Newton.*

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* In the course of my own experience, I have met with *one* person, of no common ingenuity, who seemed seriously disposed to consider the truths of geometry very nearly in this light. The person I allude to was James Ferguson, author of the justly popular works on Astronomy and Mechanics. In the year 1768, he paid a visit to Edinburgh, when I had not only an opportunity of attending his public course of lectures, but of frequently enjoying, in private, the pleasure of his very interesting conversation. I remember distinctly to have heard him say, that he had more than once attempted to study the Elements of Euclid; but found himself quite unable to enter into that species of reasoning. The second proposition of the first book, he mentioned particularly as one of his stumbling-blocks at the very outset;—the circuitous process by which Euclid sets about an operation which never could puzzle, for a single moment, any man who had seen a pair of compasses, appearing to him altogether capricious and ludicrous. He added, at the same time, that as there were various geometrical theorems of which he had daily occasion to make use, he had satisfied himself of their truth, either by means of his compasses and scale, or by some mechanical contrivances of his own invention. Of one of these I have still a perfect recollection; his mechanical or experimental demonstration of the 47th proposition of Euclid's first Book, by cutting a card so as to afford an occular proof, that the squares of the two sides actually filled the same space with the square of the hypothenuse.

2. It yet remains for me to say a few words upon that superposition of triangles which is the ground-work of all our geometrical reasonings concerning the relations which different spaces bear to one another in respect to magnitude. And here I must take the liberty to remark, in the first place, that the fact in question has been stated in terms much too loose and incorrect for a logical argument. When it is said, that "all the fundamental theorems which relate to the comparison of triangles. derive their evidence from the *mere* superposition of the triangles themselves," it seems difficult, or rather impossible, to annex to the adjective *mere*, an idea at all different from what would be conveyed, if the word *actual* were to be substituted in its place; more especially, when we attend to the assertion which immediately follows, that " this mode of proof is, in reality, nothing but an ultimate appeal, though of the easiest and most familiar kind, to *external observation*." But if this be, in truth, the sense in which we are to interpret the statement quoted above, (and I cannot conceive of any other interpretation of which it admits,) it must appear obvious, upon the slightest reflection, that the statement proceeds upon a total misapprehension of the principle of *superposition*; in as much as it is not to an actual or *mere* superposition, but to an imaginary or ideal one, that any appeal is ever made by the geometer. Between these two modes of proof the difference is not only wide, but radical and essential. The one would, indeed, level geometry with physics, in point of evidence, by building the whole of its reasonings on *a fact* ascertained by mechanical measurement: The other is addressed to the understanding, and to the understanding alone, and is as rigorously conclusive as it is possible for demonstration to be.*

To those who reflect on the disadvantages under which Mr. Ferguson had laboured in point of education, and on the early and exclusive hold which experimental science had taken of his mind, it will not perhaps seem altogether unaccountable, that the refined and scrupulous logic of Euclid should have struck him as tedious, and even unsatisfactory, in comparison of that more summary and palpable evidence on which his judgment was accustomed to rest. Considering, however, the great number of years which have elapsed since this conversation took place, I should have hesitated about recording, solely on my own testimony, a fact so singular with respect to so distinguished a man, if I had not lately found, from Dr. Hutton's Mathematical Dictionary, that *he* also had heard from Mr. Ferguson's mouth, the most important of those particulars which I have now stated; and of which my own recollection is probably the more lively and circumstantial, in consequence of the very early period of my life when they fell under my notice.

" Mr. Ferguson's general mathematical knowledge (says Dr. Hutton) was little or nothing. Of algebra, he understood little more than the notation: and he has often told me he could never demonstrate one proposition in Euclid's Elements; his constant method being to satisfy himself, as to the truth of any problem, with a measurement by scale and compasses." (*Hutton's Mathematical and Philosophical Dictionary*, Article, *Ferguson*.)

* The same remark was, more than fifty years ago, made by D'Alembert, in reply to some mathematicians on the continent, who, it would appear, had then adopted a paradox very nearly approaching to that which I am now combating. " Le principe de la superposition n'est point, comme l'ont prétendu plusieurs géometres, une méthode de démontrer peu exacte et purement méchanique. La superposition, telle que les mathématiciens la conçoivent, ne consiste pas à appliquer grossièrement une figure sur une autre, pour juger par les yeux de leur égalité ou de leur différence, comme un ouvrier applique

That the reasoning employed by Euclid in proof of the fourth proposition of his first book is completely *demonstrative*, will be readily granted by those who compare its different steps with the conclusions to which we were formerly led, when treating of the nature of mathematical demonstration. In none of these steps is any appeal made to *facts* resting on the evidence of sense, nor indeed to

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son piéd sur une ligne pour la mesurer; elle consiste à imaginer une figure transportée sur une autre, et à conclure de l'égalité supposée de certaines parties de deux figures, la coincidence de ces parties entr'elles, et de leur coincidence la coincidence du reste: d'où résulte l'égalité et la similitude parfaites des figures entières." ‡

About a century before the time when D'Alembert wrote these observations, a similar view of the subject was taken by Dr. Barrow; a writer who, like D'Alembert, united to the skill and originality of an inventive mathematician, the most refined, and, at the same time, the justest ideas concerning the theory of those intellectual processes which are subservient to mathematical reasoning.—"Unde meritò vir acutissimus Willebrordus Snellius luculentissimum appellat geometriae supellectilis instrumentum hanc ipsam εφαρμοσιν. *Eam igitur in demonstrationibus mathematicis qui fastidiunt et respuunt, ut mechanicae crassitudinis ac αυτουργιας aliquid redolentem, ipsissimam geometriae basin labefactare student; ast imprudenter et frustra.* Nam εφαρμοσιν geometrae non manu sed mente peragunt, non oculi sensu, sed animi judicio aestimant. Supponunt (id quod nulla manus praestare, nullus sensus discernere valet) accuratam et perfectam congruentiam, ex eâque suppositâ justas et logicas eliciunt consequentias. Nullus hic regulae, circini, vel normae usus, nullus brachiorum labor, aut laterum contentio, rationis totum opus, artificium et machinatio est; nil mechanicam sapiens αυτουργιαν exigitur; nil, inquam, mechanicum, nisi quatenus omnis magnitudo sit aliquo modo materiae involuta, sensibus exposita, visibilis et palpabilis, sic ut quod mens intelligi jubet, id manus quadantenus exequi possit, et contemplationem praxis utcunque conetur aemulari. Quae tamen imitatio geometricae demonstrationis robur ac dignitatem nedum non infirmat aut deprimit, at validius constabilit, et attollit altius,"§ &c.—*Lectiones Mathematicae*, Lect. III.

‡ [The principle of superposition is not, as many geometers suppose, a method of demonstration unsatisfactory and purely mechanical. Superposition, as understood by mathematicians, does not consist in applying coarsely one figure upon another, in order to judge by the eye of their equality or difference, as a labourer applies his rule to measure a line; it consists in imagining a figure transported and placed upon another, and in concluding from a supposed equality of certain parts of the two figures, the coincidence of the parts between them, and from their coincidence, the coincidence of the rest; whence results the perfect equality and resemblance of the two figures.]

§ [Hence the very acute W. Snellius calls this adaptation (superposition) the most beautiful instrument in the laboratory of the geometer. They, therefore, who in the mathematical demonstrations reject and despise it, as partaking of mechanical coarseness and handicraft labour, strive, though foolishly and ineffectually, to subvert the very basis of geometry. For geometers perform this adaptation not by the hand, but the understanding, and measure not by the sense of the eye, but by the judgment of the intellect. They suppose, (what no hand can effect, no sense discern) an accurate and perfect coincidence, and from this supposition, they elicit consequences just and logical. Here are no scale, square and compasses, no labour of the hands or exercise of the muscles, the whole is the work, the artifice, and contrivance of reason. Nothing is required which has any resemblance to mechanical labour, nothing I say, mechanical, unless so far as all magnitude is in some sense involved in matter, exposed to the senses, visible and palpable; so that what the mind directs, that the hands in some sort perform, and action strives as far as possible to equal contemplation. Which imitation, so far from weakening or depressing the strength and dignity of geometrical demonstration, on the contrary, renders it more firm and elevated.]

any *facts* whatever. The constant appeal is to the *definition* of equality.[*] "Let the triangle A B C (says Euclid) be applied to the "triangle D E F; the point A to the point D, and the straight line "A B to the straight line D E; the point B *will* coincide with the "point E, because *A B is equal to D E.* And A B coinciding with D "E, A C *will* coincide with D F, *because the angle B A C is equal to* "*the angle E D F.*" A similar remark will be found to apply to every remaining step of the reasoning; and, therefore, this reasoning possesses the peculiar characteristic which distinguishes mathematical evidence from that of all the other sciences,—that it rests wholly on *hypotheses* and *definitions*, and in no respect upon any statements of *facts*, true or false. The ideas, indeed, of extension, of a triangle, and of equality, presuppose the exercise of our senses. Nay, the very idea of *superposition* involves that of *motion*, and consequently (as the parts of space are immoveable) of *a material triangle.* But where is there any thing analogous, in all this, to those *sensible facts*, which are the principles of our reasoning in physics; and which, according as they have been accurately or inaccurately ascertained, determine the accuracy or inaccuracy of our conclusions? The *material* triangle itself, as conceived by the mathematician, is the object, not of sense, but of intellect. It is not an actual *measure*, liable to expansion or contraction, from the influence of heat or of cold; nor does it require, in the ideal use which is made of it by the student, the slighest address of hand or nicety of eye. Even in explaining this demonstration, for the first time, to a pupil, how slender soever his capacity might be, I do not believe that any teacher ever thought of illustrating its meaning by the actual application of the one triangle to the other. No teacher, at least, would do so, who had formed correct notions of the nature of mathematical science.

If the justness of these remarks be admitted, the *demonstration* in question must be allowed to be as well entitled to the name, as any other which the mathematician can produce; for as our conclusions relative to the properties of the circle (considered in the light of hypothetical theorems) are not the less rigorously and necessarily true, that no material circle may any where exist corresponding exactly to the definition of that figure, so the proof given by Euclid of the fourth proposition, would not be the less demonstrative, although our senses were incomparably less acute than they are, and although no material triangle continued of the same magnitude for a single instant. Indeed, when we have once acquired the ideas of equality and of a common measure, our mathematical conclusions would not be in the least affected, if all the bodies in the universe should vanish into nothing.

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[*] It was before observed (see p. 96) that Euclid's eighth *axiom* (*magnitudes which coincide with each other are equal*) ought, in point of logical rigour, to have been stated in the form of a *definition*. In our present argument, however, it is not of material consequence whether this criticism be adopted or not. Whether we consider the proposition in question in the light of an axiom or of a definition, it is equally evident, that it does not express *a fact* ascertained by observation or by experiment.

To many of my readers, I am perfectly aware, the foregoing remarks will be apt to appear tedious and superfluous. My only apology for the length to which they have extended is, my respect for the talents and learning of some of those writers who have lent the sanction of their authority to the logical errours which I have been endeavouring to correct; and the obvious inconsistency of these conclusions with the doctrine concerning the characteristics of mathematical or demonstrative evidence, which it was the chief object of this section to establish.*

SECTION IV.

OF OUR REASONINGS CONCERNING PROBABLE OR CONTINGENT TRUTHS.

I.

Narrow Field of Demonstrative Evidence.—Of Demonstrative Evidence, when combined with that of SENSE, as in Practical Geometry; and with those of Sense and of INDUCTION, as in the Mechanical Philosophy.—Remarks on a Fundamental Law of Belief, involved in all our Reasonings concerning contingent Truths.

IF the account which has been given of the nature of demonstrative evidence be admitted, the province over which it extends must be limited, almost entirely to the objects of pure mathematics. A science perfectly analogous to this, in point of evidence, may indeed be conceived (as I have already remarked) to consist of a series of propositions relating to moral, to political, or to physical subjects; but as it could answer no other purpose than to display the ingenuity of the inventor, hardly any thing of the kind has been hitherto attempted. The only exception which I can think of, occurs in the speculations formerly mentioned under the title of *theoretical mechanics.*

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* This doctrine is concisely and clearly stated by a writer whose acute and original, though very eccentric genius, seldom fails to redeem his wildest paradoxes by the new lights which he strikes out in defending them. "Demonstratio est syllogismus vel syllogismorum series, à nominum definitionibus usque ad conclusionem ultimam derivata."† (*Computatio sive Logica*, cap 6.)

It will not, I trust, be inferred, from my having adopted, in the words of Hobbes, this detached proposition, that I am disposed to sanction any one of those conclusions which have been commonly *supposed* to be connected with it, in the mind of the author: I say, *supposed*, because I am by no means satisfied, (notwithstanding the loose and unguarded manner in which he has stated some of his logical opinions) that justice has been done to his views and motives in *this* part of his works. My own notions on the subject of evidence in general, will be sufficiently unfolded in the progress of my speculations. In the mean time, to prevent the possibility of any misapprehension of my meaning, I think it proper once more to remark, that the definition of Hobbes, quoted above, is to be understood (according to *my* interpretation of it) as applying solely to the word *demonstration* in pure mathematics. The extension of the same term by Dr. Clarke and others, to reasonings which have for their object, not conditional or hypothetical, but absolute truth, appears to me to have been attended with many serious inconveniences, which these excellent authors did not foresee. Of the *demonstrations* with which Aristotle has attempted to fortify his syllogistic rules, I shall afterwards have occasion to examine the validity.

The charge of *unlimited* scepticism brought against Hobbes, has, in my opinion, been occasioned, partly by his neglecting to draw the line between absolute and hypothetical truth, and partly by his applying the word *demonstration* to our reasonings in other sciences as well as in mathematics. To these causes may perhaps be added, the offence which his logical writings must have given to the Realists of his time.

It is not, however, to Realists alone, that the charge has been confined. Leibnitz himself has given some countenance to it, in a dissertation prefixed to a work of Marius Nizolius; and Brucker, in referring to this dissertation, has aggravated not a little the cen-

† [Demonstration is a syllogism or a series of syllogisms, carried on from the definitions of words to the final conclusion.]

But if the field of mathematical demonstration be limited entirely to hypothetical or conditional truths, whence (it may be asked) arises the extensive and the various utility of mathematical knowledge, in our physical researches, and in the arts of life? The answer I apprehend, is to be found in certain peculiarities of those objects to which the suppositions of the mathematician are confined; in consequence of which peculiarities, real combinations of circumstances may fall under the examination of our senses, approximating far more nearly to what his definitions describe, than is to be expected in any other theoretical process of the human mind. Hence a corresponding coincidence between his abstract conclusions, and those facts in practical geometry and in physics which they help him to ascertain.

For the more complete illustration of this subject, it may be observed, in the first place, that although the peculiar force of that reasoning which is properly called *mathematical* depends on the circumstance of its principles being *hypothetical*, yet if, in any instance, the supposition could be ascertained as actually existing, the conclusion might, with the very same certainty, be applied. If I were satisfied, for example, that in a particular circle drawn on paper, all the *radii* were exactly equal, every property which Euclid has demonstrated of that curve might be confidently affirmed to belong to this diagram. As the thing, however, here supposed, is rendered impossible by the imperfection of our senses, the truths of geometry can never, in their practical applications, possess *demonstrative* evidence; but only that kind of evidence which our organs of perception enable us to obtain.

But although, in the practical applications of mathematics, the *evidence* of our conclusions differs essentially from that which belongs to the truths investigated in the theory, it does not therefore follow, that these conclusions are the less important. In proportion to the accuracy of our *data* will be that of all our subsequent deductions; and it fortunately happens, that the same imperfections

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sure of Hobbes, which it seems to contain. "Quin si illustrem Leibnitzium audimus, Hobbesius quoque inter nominales referendus est, eam ob causam, quod *ipso Occamo nominalior*, rerum veritatem dicat in nominibus consistere, ac, quod majus est, pendere ab arbitrio humano."[*] *Histor. Philosoph. de Ideis*, p. 209. Augustae Vindelicorum, 1723.

[*] [*If we listen to the illustrious Leibnitz, Hobbes also is to be ranked among the nominalists; for being more a nominalist than even Occam himself, he maintains that all truth consists in words, and still more, that it depends upon human judgment.*]

of sense, which limit what is physically attainable in the former, limit also, to the very same extent, what is practically useful in the latter. The astonishing precision which the mechanical ingenuity of modern times has given to mathematical instruments, has in fact, communicated a nicety to the results of practical geometry, beyond the ordinary demands of human life, and far beyond the most sanguine anticipations of our forefathers.*

This remarkable, and indeed singular coincidence of propositions purely hypothetical, with facts which fall under the examination of our senses, is owing, as I already hinted, to the peculiar nature of the *objects* about which mathematics is conversant; and to the opportunity which we have (in consequence of that *mensurability*† which belongs to all of them) of adjusting, with a degree of accuracy approximating nearly to the truth, the *data* from which we are to reason in our practical operations, to those which are assumed in our theory. The only affections of matter which these objects comprehend are extension and figure; affections which matter possesses in common with space, and which may therefore be separated in fact, as well as abstracted in thought, from all its other sensible qualities. In examining, accordingly, the relations of *quantity* connected with these affections, we are not liable to be disturbed by those physical *accidents*, which, in the other applications of mathematical science, necessarily render the result, more or less, at variance with the theory. In measuring the height of a mountain, or in the survey of a country, if we are at due pains in ascertaining our data, and if we reason from them with mathematical strictness, the result may be depended on, as accurate within very narrow limits; and as there is nothing but the incorrectness of our data by which the result can be vitiated, the limits of possible errour may themselves be assigned. But, in the simplest applications of mathematics to meanics or to physics, the abstractions which are necessary in the eory, must always leave out circumstances which are essentially nnected with the effect. In demonstrating, for example, the pro- rty of the lever, we abstract entirely from its own weight, and sider it as an inflexible mathematical line;—suppositions with hich the fact cannot possibly correspond; and for which, of course, lowances (which nothing but physical experience can enable us judge of,) must be made in practice.*

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* See a very interesting and able article, in the fifth volume of the Edinburgh *Review*, on colonel Mudge's account of the operations carried on for accomplishing a trigonometrical survey of England and Wales. I cannot deny myself the pleasure of quoting a few sentences.

"In two distances that were deduced from sets of triangles, the one measured by general Roy in 1787, the other by major Mudge in 1794, one of 24.133 miles, and the other of 38.688, the two measures agree within a foot as to the first distance, and 16 inches as to the second. Such an agreement, where the observers and the instruments were both different, where the lines measured were of such extent, and deduced from such a variety of *data*, is probably without any other example. Coincidences of this sort are frequent in the trigonometrical survey, and prove how much more, good instruments, used by skilful and attentive observers, are capable of performing, than the most sanguine theorist could have ever ventured to foretell.—

"It is curious to compare the early essays of practical geometry with the perfection to which its operations have now reached, and to consider that, while the artist had made so little progress, the theorist had reached many of the sublimest heights of mathematical speculation; that the latter had found out the area of the circle, and calculated its circumference to more than a hundred places of decimals, when the former could hardly divide an arch into minutes of a degree; and that many excellent treatises had been written on the properties of curve lines, before a straight line of considerable length had ever been carefully drawn, or exactly measured on the surface of the earth."

† See note (G.)

Next to *practical geometry*, properly so called, one of the easiest plications of mathematical theory occurs in those branches of tics which are distinguished by the name of catoptrics and diop- ics. In these, the physical principles from which we reason are w and precisely definite, and the rest of the process is as purely ometrical as the Elements of Euclid.

In that part of astronomy, too, which relates solely to the pheno- ena, without any consideration of physical causes, our reasonings e purely geometrical. The *data* indeed on which we proceed ust have been previously ascertained by observation; but the in- rences we draw from these are connected with them by mathe- atical demonstration, and are accessible to all who are acquainted ith the theory of spherics.

In *physical* astronomy, the law of gravitation becomes also a prin- ple or *datum* in our reasonings; but as in the celestial phenomena, is disengaged from the effects of the various other causes which e combined with it near the surface of our planet, this branch of hysics, as it is of all the most sublime and comprehensive in its ob- cts, so it seems, in a greater degree than any other, to open a fair d advantageous field for mathematical ingenuity.

In the instances which have been last mentioned, the evidence of ur conclusions resolves ultimately not only into that of sense, but to another law of belief formerly mentioned; that which leads us expect the continuance, in future, of the established order of phy- ical phenomena. A very striking illustration of this presents itself the computations of the astronomer; on the faith of which he redicts, with the most perfect assurance, many centuries before hey happen, the appearances which the heavenly bodies are to ex- ibit. The same fact is assumed in all our conclusions in natural hilosophy; and something extremely analogous to it in all our con- lusions concerning human affairs. They relate, in both cases, not o necessary connexions, but to *probable* or *contingent* events; of hich (how confidently soever we may expect them to take place,) he failure is by no means perceived to be impossible. Such con- lusions, therefore, differ essentially from those to which we are ed by the demonstrations of pure mathematics, which not only command our assent to the theorems they establish, but satisfy us that he contrary suppositions are absurd.

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* See note (H.)

These examples may suffice to convey a general idea of the distinction between demonstrative and probable evidence; and I purposely borrow them from sciences where the two are brought into immediate contrast with each other, and where the authority of both has hitherto been equally undisputed.

Before prosecuting any farther the subject of probable evidence, some attention seems to be due, in the first place, to the grounds of that fundamental supposition on which it proceeds,—*the stability of the order of nature.* Of this important subject, accordingly, I propose to treat at some length.

II.

Continuation of the Subject.—Of that Permanence or Stability in the Order of Nature, which is presupposed in our Reasonings concerning Contingent Truths.

I HAVE already taken notice of a remarkable principle of the mind, (whether coeval with the first exercise of its powers, or the gradual result of habit, it is not at present material to inquire,) in consequence of which, we are irresistibly led to apply to future events the results of our past experience. In again resuming the subject, I do not mean to add any thing to what was then stated concerning the origin or the nature of this principle; but shall confine myself to a few reflections on that established order in the succession of events, which it unconsciously assumes as a fact; and which, if it were not real, would render human life a continued series of errours and disappointments. In any incidental remarks that may occur on the principle itself, I shall consider its existence as a thing universally acknowledged, and shall direct my attention chiefly to its practical effects;—effects which will be found to extend equally to the theories of the learned, and to the prejudices of the vulgar. The question with regard to its *origin* is, in truth, a problem of mere curiosity; for of its actual influence on our belief, and on our conduct, no doubts have been suggested by the most sceptical writers.

Before entering, however, upon the following argument, it may not be superfluous to observe, with respect to this expectation, that, in whatever manner it at first arises, it cannot fail to be mightily confirmed and strengthened by habits of scientific research; the tendency of which is to familiarize us more and more with the simplicity and the uniformity of physical laws, by gradually reconciling with them, as our knowledge extends, those phenomena, which we had previously been disposed to consider in the light of exceptions. It is thus that, when due allowances are made for the different circumstances of the two events, the ascent of smoke appears to be no less a proof of the law of gravitation than the fall of a stone. This simplification and generalization of the laws of nature is one of the greatest pleasures which philosophy yields; and the growing confidence with which it is anticipated, forms one of the chief incentives to philosophical pursuits. Few experiments perhaps, in physics, afford more exquisite delight to the novice, or throw a stronger light on the nature and object of that science, than when he sees, for the first time, the guinea and the feather drop together in the exhausted receiver.

In the language of modern science, the established order in the succession of physical events is commonly referred (by a sort of figure or metaphor) to *the general laws of nature.* It is a mode of speaking extremely convenient from its conciseness, but is apt to suggest to the fancy a groundless, and, indeed, absurd analogy between the material and the moral worlds. As the order of society results from the *laws* prescribed by the legislator, so the order of the universe is conceived to result from certain *laws* established by the Deity. Thus, it is customary to say, that the fall of heavy bodies towards the earth's surface, the ebbing and flowing of the sea, and the motions of the planets in their orbits, are consequences of the *law* of gravitation. But although, in one sense, this may be abundantly accurate, it ought always to be kept in view, that it is not a literal but a metaphorical statement of the truth; a statement somewhat analogous to that poetical expression in the sacred writings, in which God is said "to have given his decree to the seas, "that they should not pass his commandment." In those political associations from which the metaphor is borrowed, the laws are addressed to rational and voluntary agents, who are able to comprehend their meaning, and to regulate their conduct accordingly; whereas, in the material universe, the subjects of our observation are understood by all men to be unconscious and passive, (that is, are understood to be unchangeable in their state, without the influence of some foreign and external force) and, consequently, *the order* so admirably maintained, amidst all the various *changes* which they actually undergo, not only implies *intelligence* in its first conception, but implies, in its continued existence, the incessant agency of *power*, executing the purposes of wise design. If the word *law*, therefore, be, in such instances, literally interpreted, it must mean a uniform mode of operation, prescribed by the Deity to himself; and it has accordingly been explained in this sense by some of our best philosophical writers, particularly by Dr. Clarke.* In employing, however, the word with an exclusive reference to experimental philosophy, it is more correctly logical to consider it as merely a statement of some *general fact* with respect to the order of nature;—a fact which has been found to hold uniformly in our past experience, and on the continuance of which, in future, the constitution of our mind determines us confidently to rely.

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* So likewise Halley, in his Latin verses prefixed to Newton's *Principia*

"En tibi norma poli, et divae libramina molis,
Computus en Jovis; et *quas, dum primordia rerum,*
Pangeret, omniparens leges violare Creator
Noluit."

After what has been already said, it is hardly necessary to take notice of the absurdity of that opinion, or rather of that mode of speaking, which seems to refer the order of the universe to *general laws* operating as *efficient causes*. Absurd, however, as it is, there is reason to suspect, that it has, with many, had the effect of keeping the Deity out of view, while they were studying his works. To an incautious use of the same very equivocal phrase, may be traced the bewildering obscurity in the speculations of some eminent French writers, concerning its metaphysical import. Even the great Montesquieu, in the very first chapter of his principal work, has lost himself in a fruitless attempt to explain its meaning, when, by a simple statement of the essential distinction between its literal and its metaphorical acceptations, he might have at once cleared up the mystery. After telling us that "laws, in their most extensive signification, are the necessary relations (*les rapports nécessaires*) which arise from the nature of things, and that, in this sense, *all* beings have their laws;—that the Deity has *his* laws; the material world *its* laws; intelligences superiour to man *their* laws; the brutes *their* laws; man *his* laws;"—he proceeds to remark, "That the moral world is far from being so well governed, as the material; for the former, although it has *its* laws, which are invariable, does not observe these laws so constantly as the latter." It is evident that this remark derives whatever plausibility it possesses from a play upon words; from confounding *moral* laws with *physical*; or, in plainer terms, from confounding laws which are addressed by a legislator to intelligent beings, with those general conclusions concerning the established order of the universe, to which, when legitimately inferred from an induction sufficiently extensive, philosophers have metaphorically applied the title of *Laws of Nature*. In the one case, the conformity of the law with the nature of things does not at all depend on its being observed or not, but on the reasonableness and moral obligation of the law. In the other case, the very definition of the word *law* supposes that it applies universally; in so much that, if it failed in one single instance, it would cease to be a *law*. It is, therefore, a mere quibble to say, that the laws of the material world are better observed than those of the moral; the meaning of the word *law*, in the two cases to which it is here applied, being so totally different, as to render the comparison or contrast, in the statement of which it is involved, altogether illusory and sophistical. Indeed, nothing more is necessary to strip the proposition of every semblance of plausibility, but an attention to this verbal ambiguity.*

This metaphorical employment of the word *law*, to express a general fact, although it does not appear to have been adopted in the technical phraseology of ancient philosophy, is not unusual among al writers, when speaking of those physical arrangements, m the earth or in the heavens, which continue to exhibit appearance from age to age.

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* I do not recollect any instance in the writings of Montesquieu, where he has reasoned more vaguely than in this chapter; and yet I am inclined to believe, that few chapters in the *Spirit of Laws* have been more admired. "Montesquieu (says a French writer) paroissoit à Thomas le premier des écrivains, pour la force et l'éntendue des idées, pour

> "Hic segetes, illic veniunt felicius uvae:
> Arborei foetus alibi, atque injussa virescunt
> Gramina. Nonne vides, croceos ut Tmolus odores,
> India mittit ebur, molles sua thura Sabaei?
> At Chalybes nudi ferrum, virosaque Pontus
> Castorea, Eliadum palmas Epiros equarum?
> Continuo has *leges*, aeternaque foedera certis
> Imposuit natura locis."*

me metaphor occurs in another passage of the Georgics e poet describes the regularity which is exhibited in the of the bees:

> "Solae communes natos, consortia tecta
> Urbis habent, magnisque agitant *sub legibus* aevum."†

llowing lines from Ovid's account of the Pythagorean phi- are still more in point:

, la profondeur, la nouveauté des rapports. Il est incroyable (disoit-il) tout esquieu a fait appercevoir dans ce mot si court, le mot Loi."‡ (*Nouveau storique*, Art. *Thomas*. Lyon, 1804.)

important remarks on the distinction between moral and physical laws, see n's Institutes of Moral Philosophy, last edit.

. Georg. 60.
Ere virgin earth first feel the invading share
The genius of the place demands thy care:
The culture, clime, the winds, and changeful skies,
And what each region bears and what denies.
Here golden harvests wave, there vineyards glow,
Fruit bends the bough, or herbs unbidden grow. . . . .
Her Saffron Tmolus, Ind her Ivory boasts,
Spice wings the gale round Saba's balmy coasts;
The naked Chalybes their iron yield,
The powerful Castor scents the Pontic field.
While fam'd Epirus rears the equestrian breed,
Born for the palm that crowns the Olympic steed,
In stated regions, from the Eternal Cause,
Such nature's compact and unbroken *laws*.
Sotheby.

IV. 153.
They, they alone a common race supply,
And dwell in towns beneath the public eye,
Love their own household, aid their country's cause,
Securely live beneath established *laws*.
Sotheby.

squieu appeared to Thomas the first of writers, in the force and extent of his he multitude, the depth and the novelty of his statements. It is incredible, w much Montesquieu has enabled us to understand in the simple word, law.]

"Et rerum causas, et quid natura docebat;
Quid Deus: Unde nives: quae fulminis esset origo
Jupiter, an venti, discussa nube tonarent:
Quid quateret terras, quâ sidera *lege* mearent,
Et quodcunque latet."*

I have quoted these different passages from ancient authors, chiefly as an illustration of the strength and of the similarity of the impression which the order of nature has made on the minds of reflecting men, in all ages of the world. Nor is this wonderful; for, were things differently constituted, it would be impossible for man to derive benefit from experience; and the powers of observation and memory would be subservient only to the gratification of an idle curiosity. In consequence of those uniform laws by which the succession of events is actually regulated, every fact collected with respect to the past is a foundation of sagacity and of skill with respect to the future; and, in truth, it is chiefly this application of experience to anticipate what is yet to happen, which forms the intellectual superiority of one individual above another. The remark holds equally in all the various pursuits of mankind, whether speculative or active. As an astronomer is able, by reasonings founded on past observations, to predict those phenomena of the heavens which astonish or terrify the savage;—as the chemist, from his previous familiarity with the changes operated upon bodies by heat or by mixture, can predict the result of innumerable experiments, which to others furnish only matter of amusement and wonder;—so a studious observer of human affairs acquires a prophetic foresight (still more incomprehensible to the multitude) with respect to the future fortunes of mankind;—a foresight, which, if it does not reach, like our anticipations in physical science, to particular and definite events, amply compensates for what it wants in precision, by the extent and variety of the prospects which it opens. It is from this apprehended analogy between the future and the past, that historical knowledge derives the whole of its value; and were the analogy completely to fail, the records of former ages would, in point of utility, rank with the fictions of poetry. Nor is the case different in the business of common life. Upon what does the success of men in their private concerns so essentially depend, as on their own *prudence*; and what else does this word mean, than a wise regard, in every step of their conduct, to the lessons which experience has taught them?*

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* Ovid. Met. XV. 68.

While he discoursed of heaven's mysterious *laws*,
The world's original, and nature's cause;
And what was God, and why the fleecy snows,
In silence fell, and rattling winds arose:
Which shook the stedfast earth, and whence begun
The dance of planets round the radiant sun.

I shall only add to these quotations the epigram of Claudian on the instrument said to be invented by Archimedes for representing the movements of the heavenly bodies, in which various expressions occur coinciding remarkably with the scope of the foregoing observations:—

"Jupiter in parvo cum cerneret aethera vitro
Risit, et ad superos talia dicta dedit.
Huccine mortalis progressa potentia curae;
Jam meus in fragili luditur orbe labor.
Jura Poli, rerumque fidem, legesque Deorum
Ecce Syracusius transtulit arte senex.
Inclusus variis famulatur spiritus astris,
Et vivum certis motibus urget opus.
Percurrit proprium mentitus signifer annum,
Et simulata novo Cynthia mense redit.
Jamque suum volvens audax industria mundum
Gaudet, et humana Sydera mente regit.
Quid falso insontem tonitru Salmonea miror?
Aemula naturae parva reperta manus."

In the progress of philosophical refinement at Rome, this metaphorical application of the word *law* seems to have been attended with the same consequences which (as I already observed) have resulted from an incautious use of it among some philosophers of modern Europe. Pliny tells us, that, in his time, these consequences extended both to the lettered, and to the unlettered multitude. "Pars alia astro suo eventus assignat, et nascendi *legibus;* semelque in omnes futuros unquam Deo decretum, in reliquum vero otium datum. Sedere caepit sententia haec, pariterque *et eruditum vulgus et rude* in eam cursu vadit." (*Plin. Nat. Hist.* Lib. ii.)

[Others assign to every star and to the laws of its rising, peculiar events. This opinion begins to prevail alike amongst the ignorant and the learned.]

The departments of the universe in which we have an opportunity of seeing this *regular order* displayed, are the three following: 1. The phenomena of inanimate matter; 2. The phenomena of the lower animals; and, 3. The phenomena exhibited by the human race.

1. On the first of these heads, I have only to repeat what was before remarked, That, in all the phenomena of the material world, the uniformity in the order of events is conceived by us to be complete and infallible; in so much that, to be assured of the same result upon a repetition of the same experiment, we require only to be satisfied, that both have been made in circumstances precisely similar. A single experiment, accordingly, if conducted with due attention, is considered, by the most cautious inquirers, as sufficient to establish a general physical fact; and if, on any occasion, it should be repeated a second time, for the sake of greater certainty in the conclusion, it is merely with a view of guarding against the effects of the accidental concomitants which may have escaped notice, when the first result was obtained.

2. The case is nearly similar in the phenomena exhibited by the brutes; the various tribes of which furnish a subject of examination so steady, that the remarks made on a few individuals may be extended, with little risk of errour, to the whole species. To this uniformity in their instincts it is owing, that man can so easily maintain his empire over them, and employ them as agents or instruments for accomplishing his purposes; advantages which would be wholly lost to him, if the operations of instinct were as much diversified as those of human reason. Here therefore we may plainly

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* "Prudentiam quodammodo esse divinationem." *Corn. Nep. in vita Attici.*

trace a purpose or design, perfectly analogous to that already remarked, with respect to the laws which regulate the material world; and the difference, in point of exact uniformity, which distinguishes the two classes of events, obviously arises from a certain latitude of action, which enables the brutes to accommodate themselves, in some measure to their accidental situations;—rendering them, in consequence of this power of accommodation, incomparably more serviceable to our race than they would have been, if altogether subjected, like mere matter, to the influence of regular and assignable causes. It is, moreover, extremely worthy of observation, concerning these two departments of the universe, that the uniformity in the phenomena of the latter presupposes a corresponding regularity in the phenomena of the former; in so much that, if the established order of the material world were to be essentially disturbed (the instincts of the brutes remaining the same) all their various tribes would inevitably perish. The uniformity of animal instinct, therefore, bears a reference to the constancy and immutability of physical laws, not less manifest, than that of the fin of the fish to the properties of the water, or of the wing of the bird to those of the atmosphere.

3. When from the phenomena of inanimate matter and those of the lower animals, we turn our attention to the history of our own species, innumerable lessons present themselves for the instruction of all who reflect seriously on the great concerns of human life. These lessons require, indeed, an uncommon degree of acuteness and good sense to collect them, and a still more uncommon degree of caution to apply them to practice; not only because it is difficult to find cases in which the combinations of circumstances are exactly the same; but because the peculiarities of individual character are infinite, and the real springs of action in our fellow creatures are objects only of vague and doubtful conjecture. It is, however, a curious fact, and one which opens a wide field of interesting speculation, that, in proportion as we extend our views from particulars to generals, and from individuals to communities, human affairs exhibit, more and more, a steady subject of philosophical examination, and furnish a greater number of general conclusions to guide our conjectures concerning future contingencies. To speculate concerning the character or talents of the individual who shall possess the throne of a particular kingdom, a hundred years hence, would be absurd in the extreme: But to indulge imagination in anticipating, at the same distance of time, the condition and character of any great nation, with whose manners and political situation we are well acquainted, (although even here our conclusions may be widely erroneous) could not be justly censured as a misapplication of our faculties equally vain and irrational with the former. On this subject, Mr. Hume has made some very ingenious and important remarks in the beginning of his Essay on the Rise and Progress of the Arts and Sciences

The same observation is applicable to all other cases, in which events depend on a multiplicity of circumstances. How accidental soever these circumstances may appear; and how much soever they may be placed, when individually considered, beyond the reach of our calculations, experience shows, that they are somehow or other mutually adjusted, so as to produce a certain degree of uniformity in the result; and this uniformity is the more complete, the greater is the number of circumstances combined. What can appear more uncertain than the proportion between the sexes among the children of any one family! and yet how wonderfully is the balance preserved in the case of a numerous society! What more precarious than the duration of life in an individual! and yet, in a long list of persons of the same age, and placed in the same circumstances, the mean duration of life is found to vary within very narrow limits. In an extensive district, too, a considerable degree of regularity may sometimes be traced for a course of years, in the proportion of births and of deaths to the number of the whole inhabitants. Thus, in France, Necker informs us, that "the number of births is in proportion to that of the inhabitants as one to twenty-three and twenty-four, in the districts that are not favoured by nature, nor by moral circumstances: this proportion is as one to twenty-five, twenty-five and a half, and twenty-six, in the greatest part of France: in cities, as one to twenty-seven, twenty-eight, twenty-nine, and even thirty, according to their extent and their trade." "Such proportions (he observes) can only be remarked in districts where there are no settlers nor emigrants; but even the differences arising from these (the same author adds,) and many other causes, acquire a kind of uniformity, when collectively considered, and in the immense extent of so great a kingdom."*

It may be worth while to remark, that, on the principle just stated, all the different institutions for Assurances are founded. The object at which they all aim, in common, is, to diminish the number of *accidents* to which human life is exposed; or rather, to counteract the inconveniences resulting from the irregularity of individual events, by the uniformity of general laws.

The advantages which we derive from such general conclusions as we possess concerning the order of nature, are so great, and our propensity to believe in its existence is so strong, that, even in cases where the succession of events appear the most anomalous, we are apt to suspect the operation of fixed and constant laws, though we may be unable to trace them. The vulgar, in all countries, perhaps, have a propensity to imagine, that, after a certain number of years, the succession of plentiful and of scanty harvests begins again to be repeated in the same *series* as before;—a notion to which Lord Bacon himself has given some countenance in the following passage. "There is a toy which I have heard, and I

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* Traité de l'Administration des Finances de France.

" would not have it given over, but waited upon a little. They " say it is observed in the Low countries, (I know not in what part) " that every five and thirty years, the same kind and suite of years " and weathers come about again; as great frosts, great wet, great " droughts, warm winters, summers with little heat, and the like; " and they call it *the prime*. It is a thing I do the rather mention, " because, computing backwards, I have found some concurrence."*

Among the philosophers of antiquity, the influence of the same prejudice is observable on a scale still greater; many of them having supposed, that at the end of the *annus magnus*, or Platonic year, a repetition would commence of all the trasactions that have occurred on the theatre of the world. According to this doctrine, the predictions in Virgil's Pollio will sooner or later, be literally accomplished:

> "(1) Alter erit tum Tiphys, et altera quae vehat Argo
> Delectos Heroas; erunt etiam altera bella;
> Atque iterum ad Trojam magnus mittetur Achilles."†

The astronomical cycles which the Greeks borrowed from the Egyptians and Chaldeans, when combined with that natural bias of the mind which I have just remarked, account sufficiently for this extension to the moral world, of ideas suggested by the order of physical phenomena.

Nor is this hypothesis of a *moral cycle*, extravagant as it unquestionably is, without its partisans among modern theorists. The train of thought, indeed, by which they have been led to adopt it, is essentially different; but it probably received no small degree of countenance, in their opinion, from the same bias which influenced the speculations of the ancients. It has been demonstrated by one of the most profound mathematicians of the present age,‡ that all the irregularities arising from the mutual action of the planets, are, by a combination of various arrangements, necessarily subjected to

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* Essays, Art. 59.

(1) Another Tiphys shall new seas explore;
Another Argo land the chiefs upon the Iberian shore;
Another Helen other wars create,
And great Achilles urge the Trojan state.

Dryden.

† "Tum efficitur (says Cicero, speaking of this period) cum solis et lunae, et quinque errantium ad eandem inter se comparationem confectis omnium spatiis, est facta conversio. Quae quàm longa sit, magna quaestio est: *esse vero certam et definitam necesse est.*§ *De Nat. Deorum*, Lib. ii. 74.) "Hoc intervallo (Clavius observes) quidam volunt, omnia quaecunque in mundo sunt, eodem ordine esse reditura, quo nunc cernuntur."|| (*Clav. Commentar. in Sphaeram Joannis de Sacro Bosco*, p. 57, Romae, 1607.)

‡ M. De la Grange.

§ [It takes place, when the Sun, Moon and five planets, having completed their revolutions, return to the original relative distances from each other. How long this period is, is much disputed; but that its length is fixed and determined, is absolutely certain.]

|| [At the completion of this period, according to the opinion of some, all the events of the world will return in the same order in which they now take place.]

certain periodical laws, so as for ever to secure the stability and order of the system. Of this sublime conclusion, it has been justly and beautifully observed, that "after Newton's theory of the elliptic orbits of the planets, La Grange's discovery of their periodical 'inequalities is, without doubt, the noblest truth in physical astronomy; while, in respect of the doctrine of final causes, it may 'truly be regarded as the greatest of all."* The theorists, however, to whom I at present allude, seem disposed to consider it in a very different light, and to employ it for purposes of a very different tendency. "Similar periods (it has been said) but of an extent 'that affright the imagination, probably regulate the modifications 'of the atmosphere; in as much as the same series of appearances 'must inevitably recur, whenever a coincidence of circumstances 'takes place. The aggregate labours of men, indeed, may be 'supposed, at first sight, to alter the operation of natural causes, 'by continually transforming the face of our globe; but it must be 'recollected that, as the agency of animals is itself stimulated and 'determined solely by the influence of external objects, the re'actions of living beings are comprehended in the same necessary 'system; and, consequently, that all the events within the immea'surable circuit of the universe, are the successive evolution of an 'extended series, which, at the returns of some vast period, repeats 'its eternal round during the endless flux of time."†

On this very bold argument, considered in its connexion with the scheme of necessity, I have nothing to observe here. I have mentioned it merely as an additional proof of that irresistible propensity to believe in the permanent order of physical events, which seems to form an original principle of the human constitution;—a belief essential to our existence in the world which we inhabit, as well as the foundation of all physical science; but which we obviously extend far beyond the bounds authorized by sound philosophy, when we apply it, without any limitation to that moral system, which is distinguished by peculiar characteristics, so numerous and important, and for the accommodation of which, so many reasons entitle us to presume, that the material universe, with all its constant and harmonious laws, was purposely arranged.

To a hasty and injudicious application of the same belief, in anticipating the future course of human affairs, might be traced a variety of popular superstitions, which have prevailed, in a greater or less degree, in all nations and ages; those superstitions, for example, which have given rise to the study of charms, of omens, of astrology, and of the different arts of divination. But the argument has been already prosecuted as far as its connexion with this part of the subject requires. For a fuller illustration of it, I refer to some remarks in my former volume, on the superstitious observances which, among rude nations, are constantly found blended with the practice of physic; and which, contemptible and ludicrous as they seem, have an obvious foundation, during the infancy of human reason, in those important principles of our nature, which, when duly disciplined by a more enlarged experience, lead to the sublime discoveries of inductive science.[*]

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* Edinburgh Review, Vol. XI. p. 264.

† The foregoing passage is transcribed from an article in the *Monthly Review*. I have neglected to mark the volume; but I think it is one of those published since 1800.
See Note (I.)

Nor is it to the earlier stages of society, or to the lower classes of the people, that these superstitions are confined. Even in the most enlightened and refined periods they occasionally appear; exercising, not unfrequently, over men of the highest genius and talents, an ascendant, which is at once consolatory and humiliating to the species.

" Ecce fulgurum monitus, oraculorum praescita, aruspicum
" praedicta, atque etiam parva dictu in auguriis sternutamenta et
" offensiones pedum. Divus Augustus laevum prodidit sibi calceum
" praepostere inductum, quo die seditione militari prope afflictus
" est."[†]

" Dr. Johnson (says his affectionate and very communicative
" biographer) had another particularity, of which none of his friends
" ever ventured to ask an explanation. It appeared to me some
" superstitious habit, which he had contracted early, and from
" which he had never called upon his reason to disentangle him.
" This was, his anxious care to go out or in at a door or passage,
" by a certain number of steps from a certain point, or at least so
" as that either his right or his left foot (I am not certain which)
" should constantly make the first actual movement when he came
" close to the door or passage. Thus I conjecture: for I have,
" upon innumerable occasions, observed him suddenly stop, and
" then seem to count his steps with a deep earnestness; and when
" he had neglected or gone wrong in this sort of magical movement,
" I have seen him go back again, put himself in a proper posture
" to begin the ceremony, and, having gone through it, break from
" his abstraction, walk briskly on, and join his companion."[‡]

The remark may appear somewhat out of place, but, after the last quotation, I may be permitted to say, that the person to whom it relates, great as his powers, and splendid as his accomplishments undoubtedly were, was scarcely entitled to assert, that " Education " is as well known, and has long been as well known, as ever it can be."[§] What a limited estimate of the objects of education must this great man have formed! They who know the valuable of a well regulated and unclouded mind, would not incur the weakness and wretchedness exhibited in the foregoing description, for all his literary acquirements and literary fame.

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[*] Vol. I. pp. 191, 192, 193, 3d Boston edit.

[†] Plin. Nat. Hist. Lib ii.
[So the warnings of lightning, the forebodings of oracles, the predictions of soothsayers, and also the lesser matters of sneezing and stumbling during the consultation of auguries. Augustus declared that his slipper had been put on wrong on a certain day, when he had nearly lost his life in a military mutiny.]

[‡] Boswell's Johnson, Vol. I. p. 264, 4to edit.

[§] Ibid. Vol. I. p. 514.

III.

Continuation of the Subject.—General Remarks on the Difference between the Evidence of Experience, and that of Analogy.

According to the account of experience which has been hitherto given, its evidence reaches no farther than to an anticipation of the future from the past, in cases where the same physical cause continues to operate in exactly the same circumstances. That this statement is agreeable to the strict philosophical notion of experience, will not be disputed. Wherever a change takes place, either in the cause itself, or in the circumstances combined with it in our former trials, the anticipations which we form of the future cannot with propriety be referred to experience alone, but to experience co-operating with some other principles of our nature. In common discourse, however, precision in the use of language is not to be expected, where logical or metaphysical ideas are at all concerned; and, therefore, it is not to be wondered at, that the word experience should often be employed with a latitude greatly beyond what the former definition authorizes. When I transfer, for example, my conclusions concerning the descent of heavy bodies from one stone to another stone, or even from a stone to a leaden bullet, my inference might be said, with sufficient accuracy for the ordinary purposes of speech, to have the evidence of experience in its favour; if indeed it would not savour of scholastic affectation to aim at a more rigorous enunciation of the proposition. Nothing, at the same time, can be more evident than this, that the slightest shade of difference which tends to weaken the resemblance, or rather to destroy the identity of two cases, invalidates the inference from the one to the other, as far as it rests on experience solely, no less than the most prominent dissimilitudes which characterize the different kingdoms and departments of nature.

Upon what ground do I conclude that the thrust of a sword through my body, in a particular direction, would be followed by instant death? According to the popular use of language, the obvious answer would be,—upon experience, and experience alone. But surely this account of the matter is extremely loose and incorrect; for where is the evidence that the internal structure of *my* body bears any resemblance to that of any of the other bodies which have been hitherto examined by anatomists? It is no answer to this question to tell me, that the experience of these anatomists has ascertained a uniformity of structure in every human subject which has as yet been dissected; and that therefore I am justified in concluding, that *my* body forms no exception to the general rule. My question does not relate to the soundness of this inference, but to the principle of my nature, which leads me thus not only to reason from the past to the future, but to reason from one thing to another which, in its external marks, bears a certain degree of resemblance to it. Something more than experience, in the strictest sense of that word, is surely necessary to explain the transition from what is identically the same, to what is only similar; and yet my inference in this instance is made with the most assured and unqualified confidence in the infallibility of the result. No inference, founded on the most direct and long continued experience, nor indeed any proposition established by mathematical demonstration, could more imperiously command my assent.

In whatever manner the province of experience, strictly so called, comes to be thus enlarged, it is perfectly manifest, that without some provision for this purpose, the principles of our constitution would not have been duly adjusted to the scene in which we have to act. Were we not so formed as eagerly to seize the resembling features of different things and different events, and to extend our conclusions from the individual to the species, life would elapse before we had acquired the first rudiments of that knowledge which is essential to the preservation of our animal existence.

This step in the history of the human mind has been little, if at all, attended to by philosophers; and it is certainly not easy to explain, in a manner completely satisfactory, how it is made. The following hints seem to me to go a considerable way towards a solution of the difficulty.

It is remarked by Mr. Smith, in his Considerations on the Formation of Languages, that the origin of genera and species, which is commonly represented in the schools as the effect of an intellectual process peculiarly mysterious and unintelligible, is a natural consequence of our disposition to transfer to a new object the name of any other familiar object, which possesses such a degree of resemblance to it, as to serve the memory for an associating tie between them. It is in this manner, he has shewn, and not by any formal or scientific exercise of abstraction, that, in the infancy of language, proper names are gradually transformed into appellatives; or, in other words, that individual things come to be referred to classes or assortments.*

This remark becomes, in my opinion, much more luminous and important, by being combined with another very original one, which is ascribed to Turgot by Condorcet, and which I do not recollect to have seen taken notice of by any later writer on the human mind. According to the common doctrine of logicians, we are led to suppose that our knowledge begins in an accurate and minute acquaintance with the characteristical properties of individual objects; and that it is only by the slow exercise of comparison and abstraction, that we attain to the notion of classes or *genera*. In opposition to this idea, it was a maxim of Turgot's, that some of our most abstract and general notions are among the earliest which we form.[*] What meaning he annexed to this maxim, we are not informed; but if he understood it in the same sense in which I am disposed to interpret it, he appears to me entitled to the credit of a very valuable suggestion with respect to the natural progress of human knowledge. The truth is, that our first perceptions lead us invariably to confound together things which have very little in common; and that the specifical differences of individuals do not begin to be marked with precision till the powers of observation and reasoning have attained to a certain degree of maturity. To a similar indistinctness of perception are to be ascribed the mistakes about the most familiar appearances which we daily see committed by those domesticated animals. with whose instincts and habits we have an opportunity of becoming intimately acquainted. As an instance of this, it is sufficient to mention the terrour which a horse sometimes discovers in passing, on the road, a large stone, or the waterfall of a mill.

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* A writer of great learning and ability (Dr. Magee of Dublin) who has done me the honour to animadvert on a few passages of my works, and who has softened his criticism by some expressions of regard, by which I feel myself highly flattered, has started a very acute objection to this theory of Mr. Smith, which I think it incumbent on me to submit to my readers, in his own words. As the quotation, however, with the remarks which I have to offer upon it, would extend to too great a length to be introduced here, I must delay entering on the subject till the end of this volume. See note (K.)

Notwithstanding, however, the justness of this maxim, it is nevertheless true, that every scientific classification must be founded on an examination and comparison of individuals. These individuals must, in the first instance, have been observed with accuracy, before their specific characteristics could be rejected from the generic description, so as to limit the attention to the common qualities which it comprehends. What are usually called *general ideas* or *general notions*, are therefore of two kinds essentially different from each other; those which are *general*, merely from the vagueness and imperfection of our information; and those which have been methodically *generalized*, in the way explained by logicians, in consequence of an abstraction founded on a careful study of particulars. Philosophical precision requires, that two sets of notions, so totally dissimilar, should not be confounded together; and an attention to the distinction between them will be found to throw much light on various important steps in the natural history of the mind.[†]

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[*] "M. Turgot croyoit qu'on s'étoit trompé en imaginant qu'en général l'esprit n'acquiert des idées générales ou abstraites que par la comparaison d'idées plus particulières. Au contraire, nos premières idées sont très générales puisque ne voyant d'abord qu'un petit nombre de qualités, notre idée renferme tous les êtres auxquels ces qualités sont communes. En nous éclairant, en examinant davantage, nos idées deviennent plus particulières sans jamais atteindre le dernier terme; et ce qui a pu tromper les métaphysiciens, c'est qu'alors précisément nous apprenons que ces idées sont plus générales que nous ne l'avions d'abord supposé." *Vie de Turgot*, p. 180. Berne, 1787.

[M. Turgot thought that we are mistaken in supposing that in general the mind acquires general or abstract ideas only by the comparison of particular ideas. On the contrary, our earliest ideas are very general; for perceiving at first but few properties, our idea includes all the beings to whom these qualities are common. As we become better informed upon farther examination, our ideas become more particular without ever reaching the last term; and what has deceived Metaphysicians is, that precisely at this time we find that these ideas are more general than we had at first supposed.]

I have searched in vain for some additional light on this interesting hint, in the complete edition of Turgot's works, published at Paris in 1808.

[†] The distinction above stated, furnishes what seems to me the true answer to an argument which Charron, and many other writers since, his time, have drawn in proof of the

One obvious effect of the grossness and vagueness in the perceptions of the inexperienced observer, must necessarily be to indentify under the same common appellations, immense multitudes of individuals which the philosopher will afterwards find reason to distinguish carefully from each other; and as language, by its unavoidable reaction on thought, never fails to restore to it whatever imperfections it has once received, all the indistinctness which, in the case of individual observers, originated in an ill-informed judgment, or in a capricious fancy, comes afterwards, in succeeding ages, to be entailed on the infant understanding, in consequence of its incorporation with vernacular speech. These confused apprehensions produced by language, must, it is easy to see, operate exactly in the same way as the undistinguishing perceptions of children or savages; the familiar use of a generic word, insensibly and irresistibly leading the mind to extend its conclusions from the individual to the genus, and thus laying the foundation of conclusions and anticipations which we suppose to rest on experience, when, in truth, experience has never been consulted.

In all such instances, it is worthy of observation, we proceed ultimately on the common principle,—that, in similar circumstances, the same cause will produce the same effects; and, when we err, the source of our errour lies merely in identifying different cases which ought to be distinguished from each other. Great as may be the occasional inconveniences, arising from this general principle thus misapplied, they bear no proportion to the essential advantages resulting from the disposition in which they originate, to arrange and to classify; a disposition on which (as I have elsewhere shown,) the intellectual improvement of the species is a great manner hinges. That the constitution of our nature in this respect is, on the whole, wisely ordered, as well as perfectly conformable to the general economy of our frame, will appear from a slight survey of some other principles, nearly allied to those which are at present under our consideration.

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reasoning powers of brutes, from the universal conclusions which they appear to found on the observation of particulars. "Les bestes des singuliers concluent les universels, du regard d'un homme seul cognoissent tous hommes," &c. &c. *De la Sagesse, Lib. I.* Chap 8.

Instead of saying, that brutes generalize things which are similar, would it not be nearer the truth to say, that they confound things which are different?

Many years after these observations were written, I had the satisfaction to meet with the following experimental confirmation of them, in the Abbé Sicard's Course of Instruction for the Deaf and Dumb: "J'avois remarqué que Massieu donnoit plus volontiers le même nom, un nom commun, à plusieurs individus dans lesquels il trouvoit des traits de ressemblance; les noms individuels supposoient des différences qu'il n'étoit pas encore temps de lui faire observer." (*Sicard*. pp. 30, 31.) The whole of the passage is well worth consulting.

[I remarked that Massieu more readily gave the same name, a common name, to several individuals in whom he found any marks of resemblance. Individual names supposed differences, which as yet he had not had time to observe.]

It has been remarked by some eminent writers in this part of the island,* that our expectation of the continuance of the laws of nature has a very close affinity to our faith in human testimony. The parallel might perhaps be carried, without any over-refinement, a little farther than these writers have attempted; in as much as, in both cases, the instinctive principle is in the first instance unlimited, and requires, for its correction and regulation, the lessons of subsequent experience. As the credulity of children is originally without bounds, and is afterwards gradually checked by the examples which they occasionally meet with of human falsehood, so, in the infancy of our knowledge, whatever objects or events present to our senses a strong resemblance to each other, dispose us, without any very accurate examination of the minute details by which they may be really discriminated, to conclude with eagerness, that the experiments and observations which we make with respect to one individual, may be safely extended to the whole class. It is experience alone that teaches us caution in such inferences, and subjects the natural principle to the discipline prescribed by the rules of induction.

It must not, however, be imagined, that, in instances of this sort, the instinctive principle always leads us astray; for the analogical anticipations which it disposes us to form, although they may not stand the test of a rigorous examination, may yet be sufficiently just for all the common purposes of life. It is natural, for example, that a man who has been educated in Europe should expect, when he changes his residence to any of the other quarters of the globe, to see heavy bodies fall downwards, and smoke to ascend, agreeably to the general laws to which he has been accustomed; and that he should take for granted, in providing the means of his subsistence, that the animals and vegetables, which he has found to be salutary and nutritious in his native regions, possess the same qualities wherever they exhibit the same appearances. Nor are such expectations less useful than natural; for they are completely realized, as far as they minister to the gratification of our more urgent wants. It is only when we begin to indulge our curiosity with respect to those nicer details which derive their interest from great refinement in the arts, or from a very advanced state of physical knowledge, that we discover our first conclusions, however just in the main, not to be mathematically exact; and are led by those habits which scientific pursuits communicate, to investigate the difference of circumstances to which the variety in the result is owing. After having found that heavy bodies fall downwards at the equator as they do in this island, the most obvious, and perhaps, on a superficial view of the question, the most reasonable inference would be, that the same pendulum which swings seconds at London, will vibrate at the same rate under the line. In this instance, however, the theoretical inference is contradicted by the fact;—but the contradiction is attended with no practical inconvenience to the multitude, while, in the mind of the philosopher, it only serves to awaken his attention to the different circumstances of the two cases, and, in the last result, throws a new lustre on the simplicity and uniformity of that law, from which it seemed, at first sight, an anomalous deviation.

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* See Reid's Inquiry into the Human Mind, Chap. VI. sect. 24. Campbell's Dissertation on Miracles, Part I. sect. I. Smith's Theory of Moral Sentiments, Vol. II. p. 208, &c. Boston edition.

To this uniformity in the laws which regulate the order of physical events, there is something extremely similar in the systematical regularity (subject indeed to many exceptions) which, in every language, however imperfect, runs through the different classes of its words, in respect to their inflections, forms of derivation, and other verbal filiations or affinities. How much this regularity or *analogy* (as it is called by grammarians,) contributes to facilitate the acquisition of dead and foreign languages, every person, who has received a liberal education, knows from his own experience. Nor is it less manifest, that the same circumstance must contribute powerfully to aid the memories of children in learning to speak their mother tongue. It is not my present business to trace the principles in the human mind by which it is produced. All that I would remark is, the very early period at which it is seized by children; as is strongly evinced by their disposition to push it a great deal too far, in their first attempts towards speech. This disposition seems to be closely connected with that which leads them to repose faith in testimony; and it also bears a striking resemblance to that which prompts them to extend their past experience to those objects and events of which they have not hitherto had any means of acquiring a direct knowledge. It is probable, indeed, that our expectation, in all these cases, has its origin in the same common principles of our nature; and it is certain that, in all of them, it is subservient to the important purpose of facilitating the progress of the mind. Of this nobody can doubt, who considers for a moment, that the great end to be first accomplished, was manifestly the communication of the *general rule;* the acquisition of the exceptions (a knowledge of which is but of secondary importance,) being safely entrusted to the growing diligence and capacity of the learner.

The considerations now stated, may help us to conceive in what manner conclusions derived from experience come to be insensibly extended from the individual to the species; partly in consequence of the gross and undistinguishing nature of our first perceptions, and partly in consequence of the magical influence of a common name. They seem also to show, that this natural process of thought, though not always justified by a sound logic, is not without its use in the infancy of human knowledge.

In the various cases which have been hitherto under our review, our conclusions are said in popular, and even in philosophical language, to be founded on experience. And yet the truth unquestionably is, (as was formerly observed) that the evidence of experience ches no farther than to an anticipation of the future from the t, in instances where the same cause continues to operate in cir- nstances exactly similar. How much this vagueness of expression st contribute to mislead us in many of our judgments will after- rds appear.

The observations which I have to offer upon analogy, considered a ground of scientific conjecture and reasoning, will be introduc- with more propriety in a future chapter.

IV.

nuation of the Subject.—Evidence of Testimony tacitly recognised as a Ground of lief, in our most certain conclusions concerning contingent Truths.—Difference be- een the Logical and the Popular Meaning of the word Probability.

n some of the conclusions which have been already under our sideration with respect to contingent truths, a species of evi- ce is admitted, of which no mention has hitherto been made; I an the evidence of *testimony*. In astronomical calculations, for mple, how few are the instances in which the *data* rest on the dence of our own senses; and yet our confidence in the result is , on that account, in the smallest degree weakened. On the con- ry, what certainty can be more complete, than that with which look forward to an eclipse of the sun or the moon, on the faith of ments and of computations which we have never verified, and the accuracy of which we have no ground of assurance whatev- but the scientific reputation of the writers from whom we have rowed them? An astronomer who should affect any scepticism h respect to an event so predicted, would render himself no less object of ridicule, than if he were disposed to cavil about the cer- ity of the sun's rising to-morrow.

Even in pure mathematics, a similar regard to testimony, accom- nied with a similar faith in the faculties of others, is by no means ommon. We would scruple, in a geometrical investigation, to pt, as a link in the chain, a theorem of Apollonius or of Archi- des, although he might not have leisure at the moment, to satisfy self, by an actual examination of their demonstrations, that they l been guilty of no paralogism, either from accident or design, in course of their reasonings?

In our anticipations of astronomical phenomena, as well as in se which we form concerning the result of any familiar experi- nt in physics, philosophers are accustomed to speak of the event only *probable;* although our confidence in its happening is not less nplete, than if it rested on the basis of mathematical demonstra- n. The word *probable*, therefore, when thus used, does not ply any *deficiency* in the proof, but only marks the particu- nature of that proof, as contradistinguished from another cies of evidence. It is opposed, not to what is *certain*, but to at admits of being *demonstrated after the manner of mathematicians.*

This differs widely from the meaning annexed to the same word in popular discourse; according to which, whatever event is said to be *probable*, is understood to be expected with some degree of doubt. *As certain as death—as certain as the rising of the sun*—are proverbial modes of expression in all countries: and they are, both of them, borrowed from events which, in philosophical language, are only probable or contingent. In like manner, the existence of the city of Pekin, and the reality of Caesar's assassination, which the philosopher classes with *probabilities*, because they rest solely upon the evidence of testimony, are universally classed with *certainties* by the rest of mankind; and in any case but the statement of a logical theory, the application to such truths of the word *probable*, would be justly regarded as an impropriety of speech. This difference between the technical meaning of the word *probability*, as employed by logicians, and the notion usually attached to it in the business of life; together with the erroneous theories concerning the nature of demonstration, which I have already endeavoured to refute,—have led many authors of the highest name, in some of the most important arguments which can employ human reason, to overlook that irresistible evidence which was placed before their eyes, in search of another mode of proof altogether unattainable in moral inquiries, and which, if it could be attained, would not be less liable to the cavils of sceptics.

But although, in philosophical language, the epithet *probable* be applied to events which are acknowledged to be *certain*, it is also applied to those events which are called *probable* by the vulgar. The philosophical meaning of the word, therefore, is more *comprehensive* than the popular; the former denoting that particular *species* of evidence of what contingent truths admit; the latter being confined to such *degrees* of this evidence as fall short of the highest. These different degrees of *probability* the philosopher considers as a *series*, beginning with bare possibility, and terminating in that apprehended *infallibility*, with which the phrase *moral certainty* is synonymous. To this last term of the *series*, the word *probable* is, in its ordinary acceptation, plainly inapplicable.

The satisfaction which the astronomer derives from the exact coincidence, in point of time, between his theoretical predictions concerning the phenomena of the heavens, and the corresponding events when they actually occur, does not imply the smallest doubt, on *his* part, of the constancy of the laws of nature. It resolves partly into the pleasure of arriving at the knowledge of the same truth or of the same fact by different *media*; but, chiefly, into the gratifying assurance which he thus receives, of the correctness of his principles, and of the competency of the human faculties to these sublime investigations. What exquisite delight must La Place have felt, when, by deducing from the theory of gravitation, the cause of the acceleration of the moon's mean motion,—an acceleration which proceeds at the rate of little more than 11″ in a century,—he accounted, with such mathematical precision, for all the recorded observations of her place from the infancy of astronomical science! It is from the length and abstruseness, however, of the reasoning process, and from the powerful effect produced on the imagination, by a *calculus* which brings into immediate contrast with the immensity of time, such evanescent elements as the fractional parts of a second, that the coincidence between the computation and the event appears in this instance so peculiarly striking. In other respects, our confidence in the future result rests on the same principle with our expectation that the sun will rise to-morrow at a particular instant; and, accordingly, now that the correctness of the theory has been so wonderfully verified by a comparison with facts, the one event is expected with no less assurance than the other.

With respect to those inferior degrees of *probability* to which, in common discourse, the meaning of that word is exclusively confined, it is not my intention to enter into any discussions. The subject is of so great extent, that I could not hope to throw upon it any lights satisfactory either to my reader or to myself, without encroaching upon the space destined for inquiries more intimately connected with the theory of our reasoning powers. One set of questions, too, arising out of it, (I mean those to which mathematical calculations have been applied by the ingenuity of the moderns) involve some very puzzling metaphysical difficulties,* the consideration of which would completely interrupt the train of our present speculations.

I proceed, therefore, in continuation of those in which we have been lately engaged, to treat of other topics of a more general nature, tending to illustrate the logical procedure of the mind in the discovery of scientific truth. As an introduction to these, I propose to devote one whole chapter to some miscellaneous strictures and reflections on the logic of the schools.

CHAPTER THIRD.

OF THE ARISTOTELIAN LOGIC.

SECTION I.

Of the Demonstrations of the Syllogistic Rules given by Aristotle and his Commentators.

THE great variety of speculations which, in the present state of science, the Aristotelian logic naturally suggests to a philosophical inquirer, lays me, in this chapter, under the necessity of selecting a few leading questions, bearing immediately upon the particular objects which I have in view. In treating of these, I must, of course, suppose my readers to possess some previous acquaintance with the subject to which they relate; but it is only such a *general* knowledge of its outlines and phraseology, as, in all universities, is justly considered as an essential accomplishment to those who receive a liberal education.

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* I allude more particularly to the *doubts* started on this subject by D'Alembert, in his Opuscules Mathématiques; and in his Mélanges de Littérature.

I begin with examining the pretensions of the Aristotelian logic to that pre-eminent rank which it claims among the sciences; professing, not only to rest all its conclusions on the immovable basis of demonstration, but to have reared this mighty fabric on the narrow ground-work of a single axiom. "On the basis (says the latest of his commentators) of one simple truth, Aristotle has reared a lofty and various structure of abstract science, clearly expressed and fully demonstrated."* Nor have these claims been disputed by mathematicians themselves. (1) In logica (says Dr. Wallis) structura syllogismi demonstratione nititur pure mathematicâ."† And, in another passage: "(2) Sequitur institutio logica, communi usui accommodata.—Quo videant Tirones, syllogismorum leges strictissimis demonstrationibus plane mathematicis ita fundatas, ut consequentias habeant irrefragabiles, quaeque offuciis fallaciisque detegandis sint accommodatae."‡ Dr. Reid, too, although he cannot be justly charged, on the whole, with any undue reverence for the authority of Aristotle, has yet, upon one occasion, spoken of his *demonstrations* with much more respect than they appear to me entitled to. "I believe (says he) it will be difficult, in any science, to find so large a system of truths of so very abstract and so general a nature, all fortified by demonstration, and all invented and perfected by one man. It shows a force of genius, and labour of investigation equal to the most arduous attempts."§

As the fact which is so confidently assumed in these passages would, if admitted, completely overturn all I have hitherto said concerning the nature both of axioms and of demonstrative evidence, the observations which follow seem to form a necessary sequel to some of the preceding discussions. I acknowledge, at the same time, that my chief motive for introducing them, was a wish to counteract the effect of those triumphant panegyrics upon Aristotle's Organon, which of late have been pronounced by some writers, whose talents and learning justly add much weight to their literary opinions; and an anxiety to guard the rising generation against a waste of time and attention, upon a study so little fitted, in my judgment, to reward their labour.

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* Analysis of Aristotle's Works by Dr. Gillies, Vol. I. p. 83, 2d edit.

† See the *Monitum* prefixed to the Miscellaneous Treatises annexed to the third volume of Dr. Wallis's Mathematical Works.

‡ Preface to the same volume.

§ Analysis of Aristotle's Logic.
That Dr. Reid, however, was perfectly aware that these demonstrations are more specious than solid, may be safely inferred from a sentence which afterwards occurs in the same tract. "When we go without the circle of the mathematical sciences, I know nothing in which there *seems* to be so much demonstration as in that part of logic which treats of the figures and modes of syllogisms."

(1) In logic the structure of the syllogism is supported by demonstration purely mathematical.

(2) Next follows, the institution of logic, accommodated to general use.—By this the young student may perceive, that the laws of syllogisms are so founded on the strictest mathematical demonstrations, as to furnish conclusions the most certain, and adapted to detect all sophisms and fallacies.

The first remark which I have to offer upon Aristotle's demonstrations, is, That they proceed on the obviously false supposition of its being possible to add to the conclusiveness and authority of demonstrative evidence. One of the most remarkable circumstances which distinguishes this from that species of evidence which is commonly called moral or probable, is, that it is not susceptible of degrees; the process of reasoning of which it is the result, being either good for nothing, or so perfect and complete in itself, as not to admit of support from any adventitious aid. Every such process of reasoning, it is well known, may be resolved into a series of legitimate syllogisms, exhibiting separately and distinctly, in a light as clear and strong as language can afford, each successive link of the demonstration. How far this conduces to render the demonstration more convincing than it was before, is not now the question. Some doubts may reasonably be entertained upon this head, when it is considered, that, among the various expedients employed by mathematical teachers to assist the apprehension of their pupils, none of them have ever thought of resolving a demonstration (as may always be easily done) into the syllogisms of which it is composed.[*] But, abstracting altogether from this consideration, and granting that a demonstration may be rendered more manifest and satisfactory by being syllogistically stated; upon what principle can it be supposed possible, after the demonstration has been thus analyzed and expanded, to enforce and corroborate, by any subsidiary reasoning, that irresistible conviction which demonstration necessarily commands?

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[*] From a passage indeed in a memoir by Leibnitz, (printed in the sixth volume of the Acta Eruditorum) it would seem, that a commentary of this kind, on the first six books of Euclid, had been actually carried into execution by two writers, whose names he mentions. "Firma autem demonstratio est, quae praescriptam a logica formam servat, non quasi semper ordinatis scholarum more syllogismis opus sit (quales *Christianus Herlinus* et *Conradus Dasypodius* in sex priores Euclidis libros exhibuerunt) sed ita saltem ut argumentatio concludat vi formae," &c. &c. *Acta Eruditor.* Lips. Vol. I. p. 285. Venit. 1740.

[It is a clear demonstration, which preserves the form prescribed by logic, not as if there was always need of syllogisms arranged in order, after the method of the schools, (such as C. Herlinus and C Dasypadius have exhibited in the six first books of Euclid,) but so that the reasoning is conclusive according to the form.]

I have not seen either of the works alluded to in the above sentence; and, upon less respectable authority, should scarcely have conceived it to be credible, that any person, capable of understanding Euclid, had ever seriously engaged in such an undertaking. It would have been difficult to devise a more effectual expedient for exposing, to the meanest understanding, the futility of the syllogistic theory.

It furnishes no valid reply to this objection, to allege, that mathematicians often employ themselves in inventing different demonstrations of the same theorem; for, in such instances, their attempts do not proceed from any anxiety to swell the mass of evidence, by finding (as in some other sciences) a variety of collateral arguments, all bearing, with their combined force, on the same truth;—their only wish is, to discover the easiest and shortest road by which the truth may be reached. In point of simplicity, and of what geometers call *elegance*, these various demonstrations may differ widely from each other; but, in point of sound logic, they are all precisely on the same footing. Each of them shines with its own intrinsic light alone; and the first which occurs (provided they be all equally understood) commands the assent not less irresistibly than the last.

The idea, however, on which Aristotle proceeded, in attempting to fortify one demonstration by another, bears no analogy whatever to the practice of mathematicians in multiplying proofs of the same theorem; nor can it derive the slightest countenance from their example. His object was not to teach us how to demonstrate the same thing in a variety of different ways; but to demonstrate, by abstract reasoning, the conclusiveness of demonstration. By what means he set about the accomplishment of his purpose, will afterwards appear. At present, I speak only of his *design;* which, if the foregoing remarks be just, it will not be easy to reconcile with correct views, either concerning the nature of evidence, or the theory of the human understanding.

For the sake of those who have not previously turned their attention to Aristotle's Logic, it is necessary, before proceeding farther, to take notice of a peculiarity (and, as appears to me, an impropriety,) in the use which he makes of the epithets *demonstrative* and *dialectical*, to mark the distinction between the two great classes into which he divides syllogisms; a mode of speaking which, according to the common use of language, would seem to imply, that one species of syllogisms may be more conclusive and cogent than another. That this is not the case, is almost self-evident; for, if a syllogism be perfect *in form*, it must, of necessity, be not only conclusive, but demonstratively conclusive. Nor is this, in fact, the idea which Aristotle himself annexed to the distinction; for he tells us, that it does not refer to the *form* of syllogisms, but to their *matter;* or, in plainer language, to the degree of evidence accompanying the *premises* on which they proceed.* In the two books of his last Analytics,

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* To the same purpose also Dr. Wallis: "Syllogismus *Topicus* (qui et *Dialecticus* dici solet) talis haberi solet syllogismus (seu syllogismorum series) qui firmam potius praesumptionem, seu opinionem valde probabilem creat, quam absolutam certitudinem. Non eadem ratione *Formae*, (nam syllogismi omnes, si in justa forma, sunt demonstrativi; hoc est, si praemissae verae sint, vera erit et conclusio,) sed ratione *Materiae* seu *Praemissarum;* quae ipsae, utplurimum, non sunt absolute certae, et universaliter verae; sed saltem probabiles, atque utplurimum verae." *Wallis*, *Logica*, Lib. iii. cap. 23.

[A Topical, which is called also a Dialectical Syllogism, is usually a syllogism or series of syllogisms, which creates rather a strong presumption, or a very probable opinion, cordingly, he treats of syllogisms which are said to be demonstra- re, because their premises are certain; and in his Topics, of what calls dialectical syllogisms, because their premises are only pro- ble. Would it not have been a clearer and juster mode of stating is distinction, to have applied the epithets *demonstrative* and *dia- ctical* to the truth of the *conclusions* resulting from these two sses of syllogisms, instead of applying them to the syllogisms mselves? The phrase *demonstrative syllogism* certainly seems, at st sight, to express rather the complete and necessary connexion tween the conclusion and the premises, than the certainty or the cessity of the truths which the premises assume.

To this observation it may be added, (in order to prevent any sapprehensions from the ambiguity of language,) that Aristotle's ea of the nature of demonstration is essentially different from that hich I have already endeavoured to explain. "In all demonstra- tion," (says Dr. Gillies, who, in this instance, has very accurately d clearly stated his author's doctrine,) "the first principles must be necessary, immutable, and therefore eternal truths, because those alities could not belong to the conclusion, unless they belonged to the premises, which are its causes."* According to the account of de- nstrative or mathematical evidence formerly given, the first princi- les on which it rests are not eternal and immutable truths, but defi- itions or hypotheses; and therefore, if the epithet demonstrative understood, in our present argument, as descriptive of that pecu- ar kind of evidence which belongs to mathematics, the distinction etween demonstrative aud dialectical syllogisms is reduced to this; t in the former, where all that is asserted is the necessary con- xion between the conclusion and the premises, neither the one or the other of these can with propriety be said to be either *true r false*, because both of them are entirely hypothetical: in the lat-

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n absolute certainty. Not on account of its Form (for all syllogisms, if in proper form, re demonstrative; that is, if the premises are true the conclusion will be also true) but n account of their matter or premises, which themselves, for the most part, are not abso- tely certain and universally true; but at best probable and true for the most part.]

* Aristotle's Ethics and Politics, &c. By Dr. Gillies. Vol. I. p. 96.

I am much at a loss how to reconcile this account of demonstrative evidence with the w which is given by Dr. Gillies of the nature of syllogism, and of the principles on hich the syllogistic theory is founded. In one passage, (p. 81.) he tells us, that "Aris- tle invented the syllogism, to prevent imposition arising from the abuse of words:" in a cond (p. 83.) that "the simple truth on which Aristotle has reared a lofty and various ructure of abstract science, clearly expressed and *fully demonstrated*—is itself founded the natural and universal texture of language:" in a third, (p. 86.) that "the doctrines f Aristotle's Organon have been strangely perplexed by confounding the *grammatical rinciples on which that work is built* with mathematical axioms." Is it possible to sup- pose, that Aristotle could have ever thought of applying to mere *grammatical principles,— truths founded in the natural and universal texture of language*—the epithets of *neces- ary, immutable*, and *eternal*?

I am unwilling to lengthen this note, otherwise it might be easily shewn, how utterly reconcileable, in the present instance, are the glosses of this ingenious commentator with the text of his author. Into some of these glosses it is probable that he has been uncon- sciously betrayed, by his anxiety to establish the claim of his favourite philosopher to the mportant speculations of Locke on the abuse of words, and to those of some later writers on language considered as an instrument of thought.

ter, where the premises are meant to express truths or facts, (supported, on the most favourable supposition, by a very high degree of probability,) the conclusion must necessarily partake of that uncertainty in which the premises are involved.

But what I am chiefly anxious at present to impress on the minds of my readers, is the substance of the two following propositions: *first*, That dialectical syllogisms (provided they be not sophistical) are not less demonstratively conclusive, *so far as the process of reasoning is concerned*, than those to which this latter epithet is restricted by Aristotle; and, *secondly*, That *it is to the process of reasoning alone*, and not to the premises on which it proceeds, that Aristotle's demonstrations exclusively refer. The sole object, therefore, of these demonstrations, is (as I already remarked) not to strengthen, by new proofs, principles which were doubtful, or to supply new links to a chain of reasoning which was imperfect, but to confirm one set of demonstrations by means of another. The mistakes into which some of my readers might have been led by the contrast which Aristotle's language implies between dialectical syllogisms, and those which he honours with the title of demonstrative, will, I trust, furnish a sufficient apology for the length of this explanation.

Having enlarged so fully on the professed aim of Aristotle's demonstrations, I shall despatch, in a very few pages, what I have to offer on the manner in which he has carried his design into effect. If the design be as unphilosophical as I have endeavoured to shew that it is, the apparatus contrived for its execution can be considered in no other light than as an object of literary curiosity. A process of reasoning which pretends to demonstrate the legitimacy of a conclusion which, of itself, by its own intrinsic evidence, irresistibly commands the assent, must, we may be perfectly assured, be at bottom unsubstantial and illusory, how specious soever it may at first sight appear. Supposing all its inferences to be strictly just, it can only bring us round again to the point from whence we set out.

The very acute strictures of Dr. Reid, in his Analysis of Aristotle's Logic, on this part of the Syllogistic Theory, render it superfluous for me, on the present occasion, to enter into any details upon the subject. To this small, but valuable tract, therefore, I beg leave to refer my readers; contenting myself with a short extract, which contains a general and compendious view of the conclusion drawn, and of the argument used to prove it, in each of the three figures of syllogisms.

" In the first figure, the conclusion affirms or denies something of " a certain species or individual; and the argument to prove this " conclusion is, That the same thing may be affirmed or denied of " the whole genus to which that species or individual belongs.

" In the second figure, the conclusion is, That some species or " individual does not belong to such a genus; and the argument is, " That some attribute common to the whole genus does not belong " to that species or individual.

“ In the third figure, the conclusion is, That such an attribute belongs to part of a genus; and the argument is, That the attribute in question belongs to a species or individual which is part of that genus.

“ I apprehend that, in this short view, every conclusion that falls within the compass of the three figures, as well as the mean of proof, is comprehended. The rules of all the figures might be easily deduced from it; and it appears that there is only one principle of reasoning in all the three; so that it is not strange, that a syllogism of one figure should be reduced to one of another figure.

“ The general principle in which the whole terminates, and of which every categorical syllogism is only a particular application, is this, That what is affirmed or denied of the whole genus may be affirmed or denied of every species and individual belonging to it This is a principle of undoubted certainty indeed, but of no great depth. Aristotle and all the logicians assume it as an axiom, or first principle, from which the syllogistic system, as it were, takes its departure; and after a tedious voyage, and great expense of demonstration, it lands at last in this principle, as its ultimate conclusion. *O curas hominum! O quantum est in rebus inane!*”[*]

When we compare this mockery of science with the unrivalled powers of the inventor, it is scarcely possible to avoid suspecting, that he was anxious to conceal its real poverty and nakedness, under the veil of the abstract language in which it was exhibited. It is observed by the author last quoted, that Aristotle hardly ever gives examples of real syllogisms to illustrate his rules; and that his commentators, by endeavouring to supply this defect, have only brought into contempt the theory of their master. “ We acknowledge (says he) that this was charitably done, in order to assist the conception in matters so very abstract; but whether it was prudently done for the honour of the art, may be doubted.” One thing is certain, that when we translate any of Aristotle's demonstrations from the general and enigmatical language in which he states it, into more familiar and intelligible terms, by applying it to a particular example, the mystery at once disappears, and resolves into some self-evident or identical puerility. It is surely a strange mode of proof, which would establish the truth of what is obvious, and what was never doubted of, by means of an argument which appears quite unintelligible, till explained and illustrated by an instance perfectly similar to the very thing to be proved.

“ If A (says Aristotle) is attributed to every B, and B to every C, it follows necessarily, that A may be attributed to every C.”[†]

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[*] This axiom is called, in scholastic language, the *dictum de omni et de nullo.*

[†] Analyt. Prior. cap. iv.

It is obvious, that Aristotle's symbolical demonstrations might be easily thrown into the form of symbolical syllogisms. The circumstance which induced him to prefer the former mode of statement, was, probably, that he might avoid the appearance of reasoning in a circle, by employing the syllogistic theory to demonstrate itself. It is curious how it should have escaped him, that, in attempting to shun this fallacy, he had fallen into ano-

Such is the demonstration given of the first mode of the first figure; and it is obviously nothing more than the axiom, called the *dictum de omni*, concealed under the disguise of an uncouth and cabalistical phraseology. The demonstrations given of the other legitimate modes are all of the same description.

In disproving the illegitimate modes, he proceeds after a similar manner; condescending, however, in general, to supply us, by way of example, with three terms, such as *bonum*, *habitus*, *prudentia*; *album*, *equus*, *cygnus*;—which three terms, we are left, for our own satisfaction, to form into illegitimate syllogisms of the particular figure and mode which may be under consideration. The manifest inconclusiveness of every such syllogism, he seems to have thought, might assist readers of slower apprehension in perceiving more easily the import of the general proposition. The inconclusiveness, for instance, of those modes of the first figure, in which the major is particular, is thus stated and explained. "If A is or is not in some "B, and B in every C, no conclusion follows. Take for the terms " i nthe affirmative case, *good*, *habit*, *prudence*; and in the negative, " *good*, *habit*, *ignorance*."* With respect to such passages as this, Dr. Reid has perfectly expressed my feeling, when he says; That " the laconic style of the author, the use of symbols not familiar, " and, in place of giving an example, his leaving us to form one from " three assigned terms, give such embarrassment to a reader, that he " is like one reading a book of riddles."† Can it be reasonably supposed, that so great an obscurity in such a writer was not the effect of some systematical design?

From the various considerations already stated, I might perhaps, without proceeding farther, be entitled to conclude, that Aristotle's demonstrations amount to nothing more than to a specious and imposing parade of words; but the innumerable testimonies to their validity, from the highest names, and the admiration in which they continue to be held by men of distinguished learning, render it necessary for me, before dismissing the subject, to unfold a little more completely some parts of the foregoing argument.

It may probably appear to some of my readers superfluous to remark, after the above-cited specimens of the reasonings in question, that not one of these demonstrations ever carry the mind forward, a single step, from one truth to another; but merely from a *general axiom* to some of its particular exemplifications. Nor is this all; they carry the mind in a direction *opposite* to that in which its judgments are necessarily formed. The meaning of a general axiom, it is well known, is seldom, if ever intelligible, till it has

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ther exactly of the same description;—that of employing an argument in the common form to demonstrate the legitimacy of syllogisms, after having represented a syllogistic analysis as the only infallible test of the legitimacy of a demonstration.

* Analyt. Prior. cap. iv.

† Dr. Gillies has attempted a vindication of the use which Aristotle, in his demonstrations, has made of the letters of the alphabet. For some remarks on this attempt, see *Note* (L.)

been illustrated by some example; whereas Aristotle, in all his demonstrations, proceeds on the idea, that the truth of an axiom, in particular instances, is *a logical consequence* of its truth, as enunciated in general terms. Into this mistake, it must be owned, he was not unnaturally led by the place which is assigned to axioms at the beginning of the elements of geometry, and by the manner in which they are afterwards referred to in demonstrating the propositions. "Since A (it is said) is equal to B, and B to C, A is equal to C; *for, things which are equal to one and the same thing, are equal to one another.*" This place, I have little doubt, has been occupied by mathematical axioms, as far back, at least, as the foundation of the Pythagorean school; and Aristotle's fundamental axiom will be found to be precisely of the same description. Instead, therefore, of saying, with Dr. Gillies, that "on the basis of one single truth Aristotle has reared a lofty and various structure of abstract science,"—it would be more correct to say that the whole of this science is comprised or implied in the terms of one single axiom. Nor must it be forgotten (if we are to retain Dr. Gillies's metaphor) that the structure may, with much more propriety, be considered as the basis of the axiom, than the axiom of the structure.

When it is recollected, that the greater part of our best philosophers (and among the rest Dr. Reid) still persevere, after all that Locke has urged on the opposite side of the question, in considering axioms as the ground-work of mathematical science, it will not appear surprising, that Aristotle's demonstrations should have so long continued to maintain their ground in books of logic. That this idea is altogether erroneous, in so far as mathematics is concerned, has been already sufficiently shewn; the whole of that science resting ultimately, not on axioms, but on definitions or hypotheses. By those who have examined my reasonings on this last point, and who take the pains to combine them with the foregoing remarks, I trust it will be readily allowed, that the syllogistic theory furnishes no exception to the general doctrine concerning demonstrative evidence, which I formerly endeavoured to establish; its pretended demonstrations being altogether nugatory, and terminating at last (as must be the case with every process of thought involving no *data* but what are purely axiomatical) in the very proposition from which they originally set out.

The idea, that all demonstrative science must rest ultimately on axioms, has been borrowed, with many other erroneous maxims, from the logic of Aristotle; but is now, in general, stated in a manner much more consistent (although perhaps not nearer to the truth) than in the works of that philosopher. According to Dr. Reid, the degree of evidence which accompanies our conclusions, is necessarily determined by the degree of evidence which accompanies our first principles; so that, if the latter be only probable, it is perfectly impossible that the former should be certain. Agreeing, therefore, with Aristotle, in considering axioms as the basis of all demonstrative science, he was led, at the same time, in conformity with the doctrine just mentioned, to consider them as eternal and immutable truths, which are perceived to be such by an intuitive judgment of the understanding. This, however, is not the language of Aristotle; for, while he tells us, that there is no demonstration but of eternal truths,* he asserts, that the first principles which are the foundation of all demonstration, are got by induction from the informations of sense.† In what manner this apparent contradiction is to be reconciled, I leave to the consideration of his future commentators.

For my own part, I cannot help being of opinion with Lord Monboddo (who certainly was not wanting in a due respect for the authority of Aristotle) that the syllogistic theory would have accorded much better with the doctrine of Plato concerning *general ideas*, than with that held on the same subject by the founder of the Peripatetic school.‡ To maintain that, in all demonstration, we argue from generals to particulars, and, at the same time, to assert, that the necessary progress of our knowledge is from particulars to generals, by a gradual induction from the informations of sense, do not appear, to an ordinary understanding, to be very congruous parts of the same system;§ and yet the last of these tenets has been eagerly claimed as a discovery of Aristotle, by some of the most zealous admirers of his logical demonstrations.||

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* Φανερον δε και, εαν ωσιν αἱ προτασεις καθολου εξ ὧν ὁ συλλογισμος. ὁτι αναγκη και το συμπερασμα αιδιον ειναι της τοιαυτης αποδειξεως, και της (ἁπλως ειπειν) αποδειξεως ουκ εστιν αρα αποδειξις των φθαρτων, ουδ' επιστημη ἁπλως, αλλ' ουτως, ωσπερ κατα συμβεβηκος. Analyt. Post. Lib. i cap. viii.

[It is clear, if the propositions of which the syllogism is composed, are universal, that the conclusion of a demonstration of this kind, and indeed of demonstration generally, must be universally true. It is not then a demonstration of truths not eternal, nor knowledge, speaking simply, but only accidentally.]

† Εκ μεν ουν αισθησεως γιγνεται μνημη· εκ δε μνημης πολλακις του αυτου γινομενης, εμπειρια· αἱ γαρ πολλαι μνημαι τῳ αριθμῳ, εμπειρια μια εστιν. εκ δ' εμπειριας η εκ παντος ηρεμησαντος του καθολου εν τῃ ψυχῃ, του ἑνος παρα τα πολλα, ὁ αν εν ἁπασιν ἓν ενῃ εκεινοις το αυτο, τεχνης αρχη και επιστημης. εαν μεν περι γενεσιν, τεχνης. εαν δε περι το ον, επιστημης. (Analyt. Post. Lib. ii. cap. xix.) The whole chapter may be read with advantage by those who wish for a fuller explanation of Aristotle's opinion on this question. His illustration of the intellectual process by which general principles are obtained from the perceptions of sense, and from reiterated acts of memory resolving into *one experience*, is more particularly deserving of attention.

[Remembrance arises from perception, but from memory often repeated, experience; for many remembrances form but one experience. But from the experience of each single action taken universally in the mind, of one thing from many, what is in all the same, arise art and science; if it concerns production, of art; if knowledge of what already exists, of science.]

‡ Ancient Metaphysics, Vol. V. pp. 184, 185.

§ It may perhaps be asked, Is not this the very mode of philosophizing recommended by Bacon, first, to proceed analytically from particulars to generals, and then to reason synthetically from generals to particulars? My reply to this question (a question which will not puzzle any person at all acquainted with the subject) I must delay, till I shall have an opportunity, in the progress of my work of pointing out the essential difference between the meanings annexed to the word *induction*, in the Aristotelian, and in the Baconian logic.—Upon the present occasion, it is sufficient to observe, that Bacon's plan of investigation was never supposed to be applicable to the discovery of principles which are necessary and eternal.

|| See Dr. Gillies's Analysis of Aristotle's works, *passim*.

In this learned, and on the whole very instructive performance, I find several doctrines ascribed to Aristotle, which appear not a little at variance with each other. The follow-

In *this* point of view, Lord Monboddo has certainly conducted, with greater skill, his defence of the syllogistic theory; in as much as he has entirely abandoned the important conclusions of Aristotle concerning the natural progress of human knowledge; and has attempted to entrench himself in (what was long considered as one of the most inaccessible fastnesses of the Platonic philosophy) the very ancient theory, which ascribes to *general ideas* an existence necessary and eternal. Had he, upon this occasion, after the example of Aristotle, confined himself solely to abstract principles, it might not have been an easy task to refute, to the satisfaction of common readers, his metaphysical arguments. Fortunately, however, he has favoured us with some examples and illustrations, which render this undertaking quite unnecessary; and which, in my opinion, have given to the cause which he was anxious to support, one of the most deadly blows which it has ever received. The following panegyric, in particular, on the utility of logic, while it serves to shew that, in admiration of the Aristotelian demonstrations, he did not yield to Dr. Gillies, forms precisely such a comment as I myself could have wished for, on the leading propositions which I have now been attempting to establish.

“ In proof of the utility of logic[*] (says Lord Monboddo) I will give an example of an argument to prove that man is a substance; which argument, put into the syllogistic form, is this:

“ *Every Animal is a Substance;*
“ *Every Man is an Animal;*
“ *Therefore every Man is a Substance.*”

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ing passages (which I am led to select from their connexion with the present argument) strike me as not only widely different, but completely contradictory, in their import.

“ According to Aristotle, *definitions* are the foundations of all science, *but those fountains are pure only when they originate in an accurate examination, and patient comparison of the perceptible qualities of individual objects.*” Vol. I. p. 77.

“ Demonstrative truth can apply only to those things which *necessarily* exist after a certain manner, and whose state is unalterable: and we know those things when we know their causes: Thus we know a mathematical proposition, when we know the causes that make it true; that is, when we know all the intermediate propositions, up to *the first principles or axioms, on which it is ultimately built.*” Ibid. pp. 95, 96.

It is almost superfluous to observe, that while the former of these quotations founds all demonstrative evidence on *definitions*, the latter founds it upon *axioms*. Nor is this all. The former (as is manifest from the second clause of the sentence) can refer only to *contingent* truths; in as much as the most accurate examination of the perceptible qualities of individual objects can never lead to the knowledge of things which *necessarily exist after a certain manner*. The latter as obviously refers (and exclusively refers) to truths which resemble mathematical theorems.

As to Aristotle's assertion, that *definitions* are the first principles of all *demonstrations* (*αἱ αρχαι των αποδειξεων οἱ ὁρισμοι*) it undoubtedly seems, at first view, to coincide exactly with the doctrine which I was at so much pains to inculcate, in treating of that peculiar evidence which belongs to mathematics. I hope, however, I shall not, on this account, be accused of plagiarism, when it is considered, that the commentary upon these words, quoted above from Dr. Gillies, absolutely *excludes* mathematics from the number of those sciences to which they are to be applied.—On this point, too, Aristotle's own language is decisive. Εξ *αναγκαιων αρα συλλογισμος εστιν ἡ αποδειξις*. Analyt. Poster. Lib. i. cap. iv.

[*] Ancient Metaphysics, Vol. V. p. 152.

"There is no man, I believe, who is not convinced of the truth "of the conclusion of this syllogism: But how he is convinced of "this, and for what reason he believes it to be true, no man can "tell, who has not learned, from the logic of Aristotle, to know "what a proposition, and what a syllogism is. There he will learn "that every proposition affirms or denies something of some other "thing. What is affirmed or denied is called the Predicate; and "that of which it is affirmed or denied, is called the Subject. The "predicate being a more general idea than the subject of which it "is predicated, must contain or include it, if it be an affirmative "proposition; or if it be a negative proposition, it must exclude it. "This is the nature of propositions: And as to syllogism, the use "of it is to prove any proposition that is not self-evident. And "this is done by finding out what is called a *middle term*; that is, a "term connected with both the predicate and the subject of the "proposition to be proved. Now, the proposition to be proved "here is, that *man is a substance*; or, in other words, that *substance* "can be predicated of *man*: And the middle term, by which this "connexion is discovered, is *animal*, of which substance is predi-"cated; and this is the major proposition of the syllogism, by which "the major term of the proposition to be proved, is predicated of "the middle term. Then *animal* is predicated of *man*; and this is "the minor proposition of the syllogism, by which the middle term "is predicated of the lesser term, or subject of the proposition to "be proved. The conclusion, therefore, is, that as substance con-"tains animal, and man is contained in animal, or is part of animal, "therefore *substance* contains *man*. And the conclusion is neces-"sarily deduced from the axiom I have mentioned, as the founda-"tion of the truth of the syllogism, 'That the whole is greater "than any of its parts, and contains them all.' So that the truth of "the syllogism is as evident as when we say, that if A contain B, "and B contain C, then A contains C.

"In this manner Aristotle has demonstrated the truth of the syllo-"gism. But a man, who has not studied his logic, can no more tell "why he believes the truth of the syllogism above mentioned, con-"cerning *man being a substance*, than a joiner, or any common me-"chanic, who applies a foot or a yard to the length of two bodies, "and finds that both agree exactly to that measure, and are neither "longer nor shorter, can give a reason why he believes the bodies "to be equal, not knowing the axiom of Euclid, 'That two things, "which are equal to a third thing, are equal to one another.'

"By this discovery Aristotle has answered the question, which "Pontius Pilate, the Roman Governour, asked of our Saviour, *What "Truth is?* The answer to which appears now to be so obvious, "that I am persuaded Pilate would not have asked it as a ques-"tion, which he no doubt thought very difficult to be answered, if "he had not studied the logic of Aristotle."*

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* Ancient Metaphysics, Vol. V. pp. 152, 153, 154.

I have quoted this passage at length, because I consider it as an instructive example of the effects likely to be produced on the understanding by scholastic studies, where they

After perusing the above exposition of Aristotle's demonstration, the reader, if the subject be altogether new to him, will be apt to imagine, that the study of logic is an undertaking of much less difficulty than he had been accustomed formerly to apprehend; the whole resolving ultimately into this axiom, "That if A contains B, "and B contains C, then A contains C." In interpreting this axiom, he will probably figure to himself A, B, and C, as bearing some resemblance to three boxes, the sizes of which are so adapted to each other, that B may be literally put into the inside of A, and C into the inside of B. Perhaps it may be reasonably doubted, if there is one logician in a hundred, who ever dreamed of understanding it in any other sense. When considered in this light, it is not surprising that it should instantly command the assent of the merest novice: Nor would he hesitate one moment longer about its truth, if, instead of being limited (in conformity to the three terms of a syllogism) to the three letters, A, B, C, it were to be extended from A to Z; *the series of boxes* corresponding to the *series of letters*, being all conceived to be *nestled*, one within another, like those which we sometimes see exhibited in the hands of a juggler.

If the curiosity of the student, however, should lead him to inquire a little more accurately into Aristotle's meaning, he will soon have the mortification to learn that when one thing is said by the logician, *to be in another* or *to be contained in another*, these words are not to be understood in their ordinary and most obvious sense, but in a particular and technical sense, known only to adepts; and about which (we may remark by the way) adepts are not, to this day, unanimously agreed. "To those (says Lord Monboddo) who know "no more of logic nor of ancient philosophy than Mr. Locke did, it "will be necessary to explain in what sense one idea can be said to "contain another, or the idea less general can be said to be a part "of the more general. And, in the first place, it is not in the sense "that one body is said to be a part of another, or the greater body "to contain the lesser; nor is it as one number is said to contain "another; but it is *virtually* or *potentially* that the more general "idea contains the less general. In this way the genus con-"tains the species; for the genus may be predicated of every "species under it, whether existing or not existing; so that *vir-"tually* it contains all the species under it, which exist or may ex-

become a favourite and habitual object of pursuit. The author (whom I knew well, and for whose memory I entertain a sincere respect) was a man of no common mental powers. Besides possessing a rich fund of what is commonly called learning, he was distinguished by natural acuteness; by a more than ordinary share of wit; and, in the discharge of his judicial functions, by the singular correctness, gravity, and dignity of his unpremeditated elocution;—and yet, so completely had his faculties been subdued by the vain abstractions and verbal distinctions of the schools, that he had brought himself seriously to regard such discussions as that which I have here transcribed from his works, not only as containing much excellent sense, but as the quintessence of sound philosophy. As for the mathematical and physical discoveries of the Newtonians, he held them in comparative contempt, and was probably prevented, by this circumstance, from ever proceeding farther than the first elements of these sciences. Indeed, his ignorance of both was wonderful, considering the very liberal education which he had received, not only in his own country, but at a foreign university.

" ist. And not only does the more general contain the less general, " but (what at first sight may appear surprising) the less general " contains the more general, not *virtually* or *potentially* but *actually*. " Thus, the genus animal contains *virtually* man, and every other " species of animal either existing or that may exist: But the genus " animal is contained in man, and in other animals *actually;* for man " cannot exist without being in *actuality* and not *potentially* only, as " animal."*

If we have recourse to Dr. Gillies for a little more light upon this question, we shall meet with a similar disappointment. According to him, the meaning of the phrases in question is to be sought for in the following definition of Aristotle: " To say that one thing is " contained in another, is the same as saying, that the second can " be predicated of the first in the full extent of its signification; and " one term is predicated of another in the full extent of its significa" tion, when there is no particular denoted by the subject, to which " the predicate does not apply."† In order, therefore, to make sure of Aristotle's idea, we must substitute the definition instead of the thing defined; that is, instead of saying that one thing is contained in another, we must say, that " the second can be predicated of the " first in the full extent of its signification." In this last clause, I give Aristotle all the advantage of Dr Gillies's very paraphrastical version; and yet, such is the effect of the comment, that it at once converts our axiom into a riddle. I do not say that, when thus interpreted, it is altogether unintelligible; but only that it no longer possesses the same sort of evidence which we ascribe to it, while we supposed that one thing was said by the logician to be *contained* in another, in the same sense in which a smaller box is *contained* in a greater.‡

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* Ancient Metaphysics, Vol. IV. p. 73.

For the distinction betwixt containing *potentially* and *actually*, Lord Monboddo acknowledges himself indebted to a Greek author then living, Eugenius Diaconus. (*Anc. Met.* Vol. IV. p. 73.) Of this author we are elsewhere told, that he was a Professor in the Patriarch's University at Constantinople; and that he published, in pure Attic Greek, a system of logic, at Leipsic, in the year 1768. (*Origin and Progress of Language*, Vol. I. p. 45, 2d edit.) It is an extraordinary circumstance, that a discovery, on which, in Lord Monboddo's opinion *the whole truth of the syllogism depends*, should have been of so very recent a date.

† Gillies's Aristotle, Vol. I. p 73. " This remark (says Dr. Gillies) *which is the foundation of all Aristotle's logic*, has been sadly mistaken by many. Among others, Dr Reid accuses Aristotle of using as synonymous phrases, the being in a subject, and the being truly predicated of a subject; whereas the truth is, that, according to Aristotle, the meaning of the one phrase is directly the reverse of the meaning of the other." Ibid.

While I readily admit the justness of this criticism on Dr. Reid, I must take the liberty of adding, that I consider Reid's errour as a mere oversight, or slip of the pen. That he might have accused Aristotle of confounding two things which, although different in fact, had yet a certain degree of resemblance or affinity, is by no means impossible: but it is scarcely conceivable, that he could be so careless as to accuse him of confounding two things which he invariably states in direct opposition to each other. I have not a doubt, therefore, that Reid's idea was, that Aristotle used, as synonymous phrases, the being in a thing, and the being a subject of which that thing can be truly predicated; more especially, as either statement would equally well have answered his purpose.

‡ It is worthy of observation, that Condillac has availed himself of the same metaphorical and equivocal word which the foregoing comments profess to explain, in support

To both comments the same observation may be applied; that, the moment a person reads them, he must feel himself disposed to retract his assent to the axiom which they are brought to elucidate; in as much as they must convince him, that what appeared to be, according to the common signification of words, little better than a truism, becomes, when translated into the jargon of the schools, an incomprehensible, if not, at bottom, an unmeaning *ænigma*.

I have been induced to enlarge, with more minuteness than I could have wished, on this fundamental article of logic, that I might not be accused of repeating those common-place *generalities* which have, of late, been so much complained of by Aristotle's champions. I must not, however, enter any farther into the details of the system; and shall therefore proceed, in the next section, to offer a few remarks of a more practical nature, on the object and on the value of the syllogistic art.

SECTION II.

General Reflections on the Aim of the Aristotelian Logic, and on the intellectual Habits which the study of it has a tendency to form.—That the improvement of the power of reasoning ought to be regarded as only a secondary Object in the culture of the Understanding.

The remarks which were long ago made by Lord Bacon on the inutility of the *syllogism* as an organ of scientific discovery, together with the acute strictures in Mr. Locke's Essay on this form of reasoning, are so decisive in point of argument, and, at the same time, so familiarly known to all who turn their attention to philosophical inquiries, as to render it perfectly unnecessary for me, on the present occasion, to add any thing in support of them. I shall, therefore, in the sequel, confine myself to a few very general and miscellaneous reflections on one or two points overlooked by these eminent writers; but to which it is of essential importance to attend, in order to estimate justly the value of the Aristotelian logic, considered as a branch of education.[*]

It is an observation which has been often repeated since Bacon's time, and which, it is astonishing, was so long in forcing itself on

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of the theory which represents every process of sound reasoning as a series of identical propositions. "L'Analyse est la même dans toutes les sciences, parceque dans toutes elle conduit du connu à l'inconnu par le raisonnement, c'est-à-dire, par une suite de jugemens qui sont *renfermés* les uns dans les autres."[§] *La Logique.*

[*] To some of my readers it may not be superfluous to recommend, as a valuable supplement to the discussions of Locke and Bacon concerning the syllogistic art, what has been since written on the same subject, in farther prosecution of their views, by Dr. Reid in his Analysis of Aristotle's Logic, and by Dr. Campbell in his Philosophy of Rhetoric.

[§] [Analysis is the same in all the sciences, because in all, it leads from known to unknown by the reasoning process, that is to say by a succession of judgments which are included the one within the other.]

the notice of philosophers, That, in all our reasonings about the established order of the universe, experience is our sole guide, and knowledge is to be acquired only by ascending from particulars to generals; whereas the syllogism leads us invariably from universals to particulars, the truth of which, instead of being a *consequence* of the universal proposition, is *implied* and *presupposed* in the very terms of its enunciation. The syllogistic art, therefore, it has been justly concluded, can be of no use in extending our knowledge of nature.*

To this observation it may be added, That, if there are any parts of science in which the syllogism can be advantageously applied, it must be those where our judgments are formed, in consequence of an application to particular cases of certain maxims which we are not at liberty to dispute. An example of this occurs in the practice of Law. Here the particular conclusion must be regulated by the general principle, whether right or wrong. The case was similar in every branch of philosophy, as long as the authority of great names prevailed, and the old scholastic maxims were allowed, without examination, to pass as incontrovertible truths.† Since the importance of experiment and observation was fully understood, the syllogistic art has gradually fallen into contempt.

A remark somewhat similar occurs in the preface to the *Novum Organon.* "They who attributed so much to logic (says Lord Bacon) perceived very well and truly, that it was not safe to trust

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* On this point it would be a mere waste of time to enlarge, as it has been of late explicitly admitted by some of the ablest advocates for the *Organon* of Aristotle. "When Mr. Locke, (I quote the words of a very judicious and acute logician) when Mr. Locke says—'I am apt to think, that he who should employ all the force of his reason only in brandishing of syllogisms, will discover very little of that mass of knowledge, which lies yet concealed in the secret recesses of nature;'—he expresses himself with needless caution. Such a man will certainly not discover any of it And if any imagined, that the mere *brandishing of Syllogisms* could increase their knowledge, (as some of the schoolmen seemed to think) they were indeed very absurd." (*Commentary on the Compendium of Logic* used in the University of Dublin. By the Rev. John Walker, Dublin, 1805.)

To the same effect, it is remarked, by a later writer, with respect to Lord Bacon's assertion, "that *discoveries* in Natural Philosophy are not likely to be promoted by the engine of syllogism;"—"that this is a proposition which no one of the present day disputes: and which when alleged by our adversaries, as their chief objection to the study of logic, only proves, that they are ignorant of the subject about which they are speaking, and of the manner in which it is *now* taught." (*See an Anonymous Pamphlet printed at Oxford in* 1810, p. 26.) Dr. Gillies has expressed himself in terms extremely similar upon various occasions. (See in particular, Vol. I. pp. 63, 64, 2d edit.

This very important concession reduces the question about the utility of the Aristotelian logic within a very narrow compass.

† "Ce sera un sujet éternel d'étonnement pour les personnes qui savent bien ce que c'est que philosophie, que devoir que l'autorité d'Aristote a été tellement respectée dans les ecoles pendent quelques siècles, que lors qu'un disputant citoit un passage de ce philosophe, celui qui soutenoit la these n'osoit point dire *transeat*; il falloit qu'il niât le passage, ou qu'il l'expliquiât à sa manière." Dict. de Bayle. Art. *Aristote.*

[It will be always matter of wonder to those who know what philosophy is, that for several ages the authority of Aristotle was so much respected in the schools, that when one of the disputants cited a passage from this philosopher, he who sustained the thesis did not dare to say, *transeat*, (let it pass) it was necessary for him to deny the passage, or to explain it in his own favour.]

“ the understanding to itself, without the guard of any rules. “ But the remedy reached not the evil, but became a part of it: “ *For the logic which took place, though it might do well enough in the* “ *civil affairs, and the arts which consisted in talk and opinion*, yet “ comes very far short of subtilty, in the real performances of na- “ ture; and, catching at what it cannot reach, has served to con- “ firm and establish errours, rather than open a way to truth.”*

It is not, however, merely as a useless or inefficient organ for the discovery of truth, that this art is exceptionable. The importance of the very object at which it professedly aims is not a little doubtful. To exercise with correctness the powers of deduction and of argumentation; or, in other words, to make a legitimate inference from the premises before us, would seem to be an intellectual process which requires but little assistance from rule. The strongest evidence of this is, the facility with which men of the most moderate capacity learn, in the course of a few months, to comprehend the longest mathematical demonstration; a facility which, when contrasted with the difficulty of enlightening their minds on questions of morals or of politics, affords a sufficient proof, that it is not from any inability to conduct a mere logical process, that our speculative errours arise. The fact is, that, in most of the sciences, our reasonings consist of a very few steps; and yet, how liable are the most cautious and the most sagacious, to form erroneous conclusions!

To enumerate and examine the causes of these false judgments is foreign to my purpose in this section. The following (which I mention only by way of specimen) seem to be among the most powerful. 1. The imperfections of language, both as an instrument of thought, and as a medium of philosophical communication. 2. The difficulty, in many of our most important inquiries, of ascertaining the *facts* on which our reasonings are to proceed. 3. The partial and narrow views, which, from want of information, or from some defect in our intellectual comprehension, we are apt to take of subjects, which are peculiarly complicated in their details, or which are connected, by numerous relations, with other questions equally problematical. And lastly, (what is of all, perhaps, the most copious source of speculative errour) the prejudices which authority and fashion, fortified by early impressions and associations, create to warp our opinions. To illustrate these and other circumstances by which the judgment is apt to be misled in the search of truth, and to point out the most effectual means of guarding against them, would form a very important article in a philosophical system of logic; but it is not on such subjects that we are to expect information from the logic of Aristotle.*

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* As the above translation is by Mr. Locke, who has introduced it in the way of apology for the freedom of his own strictures on the school logic, the opinion which it expresses may be considered as also sanctioned by the authority of *his* name. (*See the Introduction to his Treatise on the Conduct of the Understanding.*) I cannot forbear remarking, on this occasion, that when Lord Bacon speaks of the school logic as “ answering well enough in civil affairs, and the arts which consist in talk and opinion,” his words can only apply to *dialectical* syllogisms, and cannot possibly be extended to those which Aristotle calls *demonstrative*. Whatever praise, therefore, it may be supposed to imply, must be confined to the Books of *Topics* The same observation will be found to hold with respect to the greater part of what has been alleged in defence of the syllogistic art, by Dr. Gillies, and by the other authors referred to in the beginning of this section. One of the ablest of these *seems* to assent to an assertion of Bacon, “ That logic does not help towards the invention of arts and sciences, but only of arguments ” If it only helps towards the invention of arguments, for what purpose has Aristotle treated so fully of demonstration and of science in the two books of the Last Analytics?

The fundamental idea on which this philosopher evidently proceeded, and in which he has been too implicitly followed by many even of those who have rejected his syllogistic theory, takes for granted, that the discovery of truth chiefly depends on the reasoning faculty, and that it is the comparative strength of this faculty, which constitutes the intellectual superiority of one man above another. The similarity between the words *reason* and *reasoning*, of which I formerly took notice, and the confusion which it has occasioned in their appropriate meanings, has contributed powerfully to encourage and to perpetuate this unfortunate mistake. If I do not greatly deceive myself, it will be found, on an accurate examination of the subject, that, of the different elements which enter into the composition of *reason*, in the most enlarged acceptation of that word, the power of carrying on long processes of *reasoning* or *deduction*, is, in point of importance, one of the least.†

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* In the Logic of *Port Royal*, there is a chapter, entitled, *Des sophismes d'amour propre, d'interêt, et de passion*, which is well worthy of a careful perusal. Some useful hints may be also collected from Gravesande's *Introductio ad Philosophiam*. See Book ii. Part ii. (*De Causis Errorum.*)

† It was before observed (p. 82.) "That the whole theory of syllogism proceeds on the supposition, that the same word is always to be employed in the same sense; and that, consequently, it takes for granted, in every rule which it furnishes for the guidance of our reasoning powers, that the nicest, and by far the most difficult part of the logical process has been previously brought to a successful termination."

In this remark (which, obvious as it may seem, has been very generally overlooked,) I have found, since the foregoing sheets were printed, that I have been anticipated by M. Turgot. "Tout l'artifice de ce calcul ingénieux, dont Aristote nous a donné les règles, tout l'art du syllogisme est fondé sur l'usage des mots dans le même sens; l'emploi d'un même mot dans deux sens différens fait de tout raisonnement un sophisme; et ce genre de sophisme, peut-être le plus commun de tous, est une des sources les plus ordinaires de nos erreurs."‡ *Oeuvres de M. Turgot*, Tom. III p 66

Lord Bacon had manifestly the same conclusion in view, in the following aphorism: "Syllogism consists of propositions, propositions of words, and words are the signs of notions; therefore if our notions, the basis of all, are confined, and over hastily taken from things, nothing that is built on them can be firm; whence our only hope rests upon *genuine* induction" *Nov Org*. Part. I. Sect. 1. Aph 14 (Shaw's Translation.)

On what grounds Dr. Gillies was led to hasard the assertion formerly quoted (p. 204,) that "Aristotle invented the syllogism to prevent the imposition arising from the abuse of words," I am quite unable to form a conjecture.

‡ [All the artifice of this ingenious calculus, of which Aristotle has given us the rules, all the art of syllogism, is founded upon the principle, that the words are used in the same sense; the employment of the same word in two different senses makes a sophism of the whole reasoning; and this kind of sophism, perhaps of all the most common, is one of the most ordinary sources of our errours.]

The slightest reflection, indeed, may convince us, how very little connexion the mere reasoning faculty has with the general improvement of mankind. The wonders which it has atchieved have been confined, in a great measure, to the mathematical sciences,—the only branches of human knowledge which furnish occasion for long concatenated processes of thought; and even there, *method*, together with a dexterous use of the helps to our intellectual faculties which art has discovered, will avail more than the strongest conceivable capacity, exercised solely and exclusively in habits of synthetic deduction. The tendency of these helps, it may be worth while to add, is so far from being always favourable to the power of reasoning, strictly so called, that it may be questioned, whether, among the ancient Greek geometers, this power was not in a higher state of cultivation, in consequence of their ignoranceof the algebraical symbols, than it exists in at this day, among the profoundest mathematicians of Europe.

In the other sciences, however, the truth of the remark is far more striking. By whom was ever the art of reasoning so sedulously cultivated as by the schoolmen, and where shall we find such monuments of what *mere reasoning* can accomplish, as in their writings? Whether the same end might not have been attained without the use of their technical rules, is a different question; but that they *did* succeed to a great degree, in the acquisition of the accomplishments, at which they aimed, cannot be disputed. And yet, I believe, it will be now very generally admitted, that never were labour and ingenuity employed, for so many ages, to so little purpose of real utility. The absurdity of expecting to rear a fabric of science by the art of reasoning alone, was remarked, with singular sagacity, even amidst the darkness of the 12th century, by *John of Salisbury*, himself a distinguished proficient in scholastic learning, which he had studied under the celebrated *Abelard*. "After a long absence from *Paris* (he tells us in one passage) I went to visit the companions of my early studies. I "found them, in every respect, precisely as I had left them; not "a single step advanced towards a solution of their old difficulties, "nor enriched by the accession of one new idea:—a strong experimental proof, that, how much soever logic may contribute to "the progress of the other sciences, it must forever remain barren and lifeless, while abandoned to itself."*

Among the various pursuits now followed by men liberally educated, there is none, certainly, which affords such scope to the reasoning faculty, as the science and profession of law; and accordingly, it has been observed by Mr. Burke, "That they do "more to *quicken and invigorate the understanding*, than all the "other kinds of learning put together." The same author however adds, that "they are not apt, except in persons very hap- "pily born, to open and to liberalize the mind, exactly in the same

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* Metalog. Lib. ii. cap. 10.

"proportion." Nor is this surprising; for the ultimate standards of right and wrong to which they recognize the competency of an appeal, being conventional rules and human authorities, no field is opened to that spirit of free inquiry which it is the boast of philosophy to cultivate. The habits of thought, besides, which the long exercise of the profession has a tendency to form, on its appropriate topics, seem unfavourable to the qualities connected with what is properly called *judgment;* or, in other words, to the qualities on which the justness or correctness of our *opinions* depends: they accustom the mind to those partial views of things which are suggested by the separate interests of litigants; *not* to a calm, comprehensive, and discriminating survey of details, in all their bearings and relations. Hence the apparent inconsistencies which sometimes astonish us in the intellectual character of the most distinguished practitioners—a talent for acute and refined distinctions; powers of subtle, ingenious, and close argumentation; inexhaustible resources of invention, of wit, and of eloquence;—combined, not only with an infantine imbecility in the affairs of life, but with an incapacity of forming a sound decision, even on those problematical questions which are the subjects of their daily discussion. The great and enlightened *minds*, whose judgments have been transmitted to posterity, as oracles of legal wisdom, were formed (it may be safely presumed) not by the habits of their professional warfare, but by contending with these habits, and shaking off their dominion.

The habits of a controversial writer are, in some respects, analogous to those of a lawyer; and their effects on the intellectual powers, when engaged in the investigation of truth, are extremely similar. They confine the attention to one particular view of the question, and, instead of training the understanding to combine together the various circumstances which seem to favour opposite conclusions, so as to limit each other, and to guard the judgment against either extreme,—they are apt, by presenting the subject sometimes wholly on the one side, and sometimes wholly on the other, to render the disputant the sceptical dupe of his own ingenuity. Such seems to have been nearly the case with the redoubtable Chillingworth; a person to whose native candour the most honourable testimony has been borne by the most eminent of his contemporaries, and whose argumentative powers have almost become matter of proverbial remark. Dr. Reid has pronounced him the "best "reasoner, as well as the acutest logician of his age;" and Locke himself has said, "If you would have your son to reason well, let "him read Chillingworth." To what consequences these rare endowments and attainments led, we may learn from Lord Clarendon.

"Mr. Chillingworth had spent all his younger time in disputations, "and had arrived at so great a mastery, that he was inferiour to no "man in those skirmishes: but he had, with his notable perfection "in this exercise, contracted such an irresolution and habit of doubt-

“ ing, that by degrees he grew confident of nothing.”——“ Neither “ the books of his adversaries, nor any of their persons, though he “ was acquainted with the best of both, had ever made great impression on him; all his doubts grew out of himself, when he “ assisted his scruples with all the strength of his own reason, and “ was then too hard for himself: but finding as little quiet and “ repose in those victories, he quickly recovered, by a new appeal “ to his own judgment; so that, in truth, he was in all his sallies “ lies and retreats, his own convert.”

The foregoing observations, if well founded, conclude strongly, not merely against the *form* of the school logic, but against the importance of the *end* to which it is directed. Locke and many others have already sufficiently shewn, how inadequate the syllogistic theory is to its avowed purpose; but few seem to be sufficiently aware, how very little this purpose, if it were attained, would advance us in the knowledge of those truths which are the most interesting to human happiness.

“ There is one species of madman (says Father Buffier) that “ makes an excellent logician.”*—The remark has the appearance of being somewhat paradoxical; but it is not without a solid foundation, both in fact, and in the theory of the human understanding. Nor does it apply merely (as Buffier seems to have meant it) to the scholastic defenders of metaphysical paradoxes: it extends to all whose ruling passion is a display of argumentative dexterity, without much solicitude about the justness of their premises, or the truth of their conclusions. It is observed by Lord Erskine, in one of his admirable pleadings lately published, that “ in all the cases which “ have filled Westminster-Hall with the most complicated considerations—the lunatics, and other insane persons who have been “ the subjects of them, have not only had the most perfect knowledge and recollection of all the relations they stood in towards others, and of the acts and circumstances of their lives, but *have in general, been remarkable for subtlety and acuteness*;”—“ These,” (he adds) “ are the cases which frequently mock the wisdom of the “ wisest in judicial trials; because *such persons often reason with a* “ *subtlety which puts in the shade the ordinary conceptions of mankind*: “ their conclusions are just, and frequently profound; but the premises from which they reason, *when within the range of the malady*, “ are uniformly false:—not false from any defect of knowledge or “ judgment; but because a delusive image, the inseparable companion of real insanity, is thrust upon the subjugated understanding, “ incapable of resistance, because unconscious of attack.”

In the instances here alluded to, something, it is probable, ought to be attributed to the physical influence of the disorder, in occasioning, together with an increased propensity to controversy, a preternatural and morbid excitation of the power of attention, and of some other intellectual faculties; but much more, in my opinion, to its effects in removing the check of those collateral circumstances by which, in more sober understandings, the reasoning powers are perpetually retarded and controlled in their operation. Among these circumstances, it is sufficient to specify, for the sake of illustration, 1. That distrust, which experience gradually teaches, of the accuracy and precision of the phraseology in which our reasonings are expressed;—accompanied with a corresponding apprehension of involuntary mistakes from the ambiguity and vagueness of language; 2. A latent suspicion, that we may not be fully in possession of all the elements on which the solution of the problem depends; and 3. The habitual influence of those first principles of propriety, of morality, and of common sense, which, as long as reason maintains her ascendant, exercise a paramount authority over all those speculative conclusions which have any connexion with the business of life. Of these checks or restraints on our reasoning processes, none are cultivated and strengthened, either by the rules of the logician, or by the habits of *viva voce* disputation. On the contrary, in proportion as their regulating power is confirmed, that hesitation and suspense of judgment are encouraged, which are so congenial to the spirit of true philosophy, but such fatal incumbrances in contending with an antagonist whose object is not truth but victory. In madness, where their control is entirely thrown off, the merely logical process (which never stops to analyze the meaning of words) is likely to go on more rapidly and fearlessly than before;—producing a volubility of speech, and an apparent quickness of conception, which present to common observers all the characteristics of intellectual superiority. It is scarcely necessary to add, that the same appearances, which, in this extreme case of mental aberration, are displayed on so great a scale, may be expected to shew themselves, more or less, wherever there is any deficiency in those qualities which constitute depth and sagacity of judgment.

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* Traité des Prem. Vérités. Part I. chap. xi.

For my own part, so little value does my individual experience lead me to place on argumentative address, when compared with some other endowments subservient to our intellectual improvement, that I have long been accustomed to consider that promptness of reply and dogmatism of decision which mark the eager and practised disputant, as almost infallible symptoms of a limited capacity; a capacity deficient in what Locke has called (in very significant, though somewhat homely terms) *large, sound, roundabout sense.*[*] In all the higher endowments of the understanding, this intellectual quality (to which nature as well as education must liberally contribute,) may be justly regarded as an essential ingredient. It is this which, when cultivated by study, and directed to great objects or pursuits, produces an unprejudiced, comprehensive, and efficient mind; and, where it is wanting, though we may occasionally find a more than ordinary share of quickness and of information; a plausibility and brilliancy of discourse; and that passive susceptibility of polish from the commerce of the world, which is so often united with imposing but secondary talents,—we may rest assured, that there exists a total incompetency for enlarged views and sagacious combinations, either in the researches of science or in the conduct of affairs.*

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[*] Conduct of the Understanding, § 3.

If these observations hold with respect to the art of reasoning or argumentation, as it is cultivated by men undisciplined in the contentions of the schools, they will be found to apply with infinitely greater force to those disputants (if any such are still to be found) who, in the present advanced state of human knowledge, have been at pains to fortify themselves, by a course of persevering study, with the arms of the Aristotelian logic. Persons of the former description often reason conscientiously with warmth, from false premises, which they are led by passion, or by want of information, to mistake for truth. Those of the latter description proceed systematically on the radical errour of conceiving the *reasoning process* to be the most powerful instrument by which truth is to be attained; combined with the secondary errour of supposing, that the power of reasoning may be strengthened and improved by the syllogistic art.

In one of Lord Kames's sketches, there is an amusing and instructive collection of facts to illustrate the *progress of reason*; a phrase, by which he seems to mean chiefly the progress of *good sense*, or of that quality of the intellect which is very significantly expressed by the epithet *enlightened*. To what is this progress (which has been going on with such unexampled rapidity during the two last centuries) to be ascribed? Not surely to any improvement in the art of reasoning; for many of the most melancholy weaknesses which he has recorded, were exhibited by men, distinguished by powers of discussion, and a reach of thought, which have never been surpassed; while, on the other hand, the same weakness would now be treated with contempt by the lowest of the vulgar. The principal cause, I apprehend, has been, the general diffusion of knowledge (and more especially of experimental knowledge) by the art of printing; in consequence of which, those prejudices which had so long withstood the assaults both of argument and of ridicule, have been gradually destroyed by their mutual collision, or lost in the infinite multiplicity of elementary truths which are identified with the operations of the infant understanding. To examine the process by which truth has been slowly and insensibly cleared from that admixture of errour with which, during the long night of Gothic ignorance, it was contaminated and disfigured, would form a very interesting subject of philosophical speculation. At present, it is sufficient to remark, how little we are indebted for our emancipation from this intellectual bondage, to those qualities which it was the professed object of the school logic to cultivate; and that in the same proportion in which liberality and light have spread over Europe, this branch of study has sunk in the general estimation.

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* The outlines of an intellectual character, approaching nearly to this description, is exhibited by Marmontel in his highly finished (and I have been assured, very faithful) portrait of M. de Brienne. Among the other defects of that unfortunate statesman, he mentions particularly un *esprit à facettes*; by which expression he seems, from the context, to mean a quality of mind precisely opposite to that described by Locke in the words quoted above:—"*quelques lumières, mais éparses; des apperçus plutôt que des vues; et dans les grands objets, de la facilité à saisir les petits détails, nulle capacité pour embrasser l'ensemble.*"† A consciousness of some similar deficiency has suggested to Gibbon the following criticism on his own juvenile performance, entitled *Essai sur l'Etude*. It is executed by an impartial and masterly hand; and may perhaps, without much injustice, be extended, not only to his Roman history, but to the distinguishing features of that peculiar *cast* of genius, which so strongly marks all his writings.

"The most serious defect of my essay is a kind of obscurity and abruptness which always fatigues, and may often elude the attention of the reader. The obscurity of many passages is often affected; proceeding from the desire of expressing perhaps a common idea with sententious brevity: *brevis esse laboro, obscurus fio.* Alas! how fatal has been the imitation of Montesquieu! *But this obscurity sometimes proceeds from a mixture of light and darkness in the author's mind; from a partial ray which strikes upon an angle, instead of spreading itself over the surface of an object*"

† [A genius for trifles, some intelligence, but irregular and scattered; glimpses rather than views; and in great objects, a facility in seizing little details, but no ability to embrace the whole.]

Of the inefficacy of *mere reasoning* in bringing men to an agreement on those questions which, in all ages, have furnished to the learned the chief matter of controversy, a very just idea seems to have been formed by the ingenious author of the following lines; who has, at the same time, hinted at a remedy against a numerous and important class of speculative errours, more likely to succeed, than any which is to be derived from the most skilful application of Aristotle's rules; or, indeed, from any direct argumentative refutation, how conclusive and satisfactory soever it may appear to an unbiassed judgment. It must, at the same time, be owned, that this remedy is not without danger; and that the same habits which are so useful in correcting the prejudices of the monastic bigot, and so instructive to all whose principles are sufficiently fortified by reflection, can scarcely fail to produce pernicious effects, where they operate upon a character not previously formed and confirmed by a judicious education.

En parcourant au loin la planète où nous sommes
Que verrons nous? les torts et les travers des hommes!
Ici c'est un synode, et la c'est un divan,
Nous verrons le Mufti, le Derviche, l'Iman,
Le Bonze, le Lama, le Telapoin, le Pope,
Les antiques Rabbins et les Abbés d'Europe,
Nos moines, nos prélats, nos docteurs agrégés;
Etes vous disputeurs, mes amis? voyagez.*

To these verses it may not be altogether useless to subjoin a short quotation from Mr. Locke; in whose opinion the aid of *foreign travel* seems to be less necessary for enlightening *some* of the classes of controversialists included in the foregoing enumeration, than was suspected by the poet. The moral of the passage, (if due allowances be made for the satirical spirit which it breathes) is pleasing on the whole, as it suggests the probability, that our common estimates of the intellectual darkness of our own times are not a little exaggerated.

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* Discours sur les Disputes, par M. de Rulhière.

"Notwithstanding the great noise that is made in the world about "errours and opinions, I must do mankind that right as to say, "*There are not so many men in errours and wrong opinions, as is* "*commonly supposed.* Not that I think they embrace the truth; "but, indeed, because concerning those doctrines they keep such a "stir about, they have no thought, no opinion at all. For if any "one should a little catechise the greatest part of the partisans of "most of the sects in the world, he would not find, concerning those "matters they are so zealous for, that they have any opinion of "their own: much less would he have reason to think that they "took them upon the examination of arguments and appearance of "probability. They are resolved to stick to a party that education "or interest has engaged them in; and there, like the common sol-"diers of an army, shew their courage and warmth as their leaders "direct, without ever examining, or so much as knowing the cause "they contend for. If a man's life shews that he has no serious re-"gard for religion, for what reason should we think that he beats "his head about the opinions of his church, and troubles himself to "examine the grounds of this or that doctrine? 'Tis enough for "him to obey his leaders, to have his hand and his tongue ready for "the support of the common cause, and thereby approve himself to "those who can give him credit, preferment, and protection in that "society. Thus men become combatants for those opinions they "were never convinced of; no, nor ever had so much as floating in "their head; and THOUGH ONE CANNOT SAY THERE ARE FEWER IMPROBA-"BLE OR ERRONEOUS OPINIONS IN THE WORLD THAN THERE ARE, YET THIS "IS CERTAIN, THERE ARE FEWER THAT ACTUALLY ASSENT TO THEM, AND "MISTAKE THEM FOR TRUTHS, THAN IS IMAGINED."*

If these remarks of Locke were duly weighed, they would have a tendency to abridge the number of controversial writers; and to encourage philosophers to attempt the improvement of mankind, rather by adding to the stock of useful knowledge, than by waging a direct war with prejudices, which have less root in the understandings, than in the interests and passions of their abettors.

SECTION III.

In what respects the study of the Aristotelian Logic may be useful to disputants.—A general acquaintance with it justly regarded as an essential accomplishment to those who are liberally educated.—Doubts suggested by some late writers, concerning Aristotle's claims to the invention of the Syllogistic Theory.

THE general result of the foregoing reflections is, That neither the means employed by the school logic for the assistance of the *discursive faculty*, nor the accomplishment of that end, were it really attained, are of much consequence in promoting the enlargement of the mind, or in guarding it against the influence of erroneous opinions. It is, however, a very different question, how far this art may be of use to such as are led by profession or inclination to try their strength in polemical warfare. My own opinion is, that, in the present age, it would not give to the disputant, in the judgment of men whose suffrage is of any value, the slightest advantage over his antagonist. In earlier times, indeed, the case must have been different. While the scholastic forms continued to be kept up, and while schoolmen were the sole judges of the contest, an expert logician could not fail to obtain an easy victory over an inferiour proficient. *Now*, however, when the supreme tribunal to which all parties must appeal, is to be found, not *within* but *without* the walls of universities; and when the most learned dialectician must, for his own credit, avoid all allusion to the technical terms and technical forms of his art, can it be imagined that the mere possession of its rules furnishes him with invisible aid for annoying his adversary, or renders him invulnerable by some secret spell against the weapons of his assailant?* Were this really the case, one might have expected that the advocates who have undertaken its defence, (considering how much their pride was interested in the controversy) would have given us some better specimens of its practical utility, in defending it against the unscientific attacks of Bacon and of Locke. It is, however, not a little remarkable, that, in every argument which they have attempted in its favour, they have not only been worsted by those very antagonists whom they accuse of ignorance, but fairly driven from the field of battle.†

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* Essay on Human Understanding. Book iv. c. 20.

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* An argument of this sort in favour of the Aristotelian logic, has, in fact, been lately alleged, in a treatise to which I have already had occasion to refer.

"Mr. Locke seems throughout to imagine that no use can be made of the doctrine of syllogisms, unless by men who deliver their reasonings in syllogistic form. That would, indeed, justly expose a man to the imputation of disgusting pedantry and tediousness. But, in fact, he who never uses an expression borrowed from the Aristotelic logic, may yet, unobserved, be availing himself, in the most important manner, of its use, by bringing definitions, divisions, and arguments, to the test of its rules.

"In the mere application of it to the examining of an argument which we desire to refute,—the logician will be able to bring the argument in his own mind to syllogistic form.—He will then have before his view every constituent part of the argument; some of which may have been wholly suppressed by his antagonist, and others disguised by ambiguity and declamation.—He knows every point in which it is subject to examination.—He perceives immediately, by the rules of his art, whether the premises may be acknowledged, and the conclusion denied, for want of a *vis consequentiae*.—If not, he knows where to look for a weakness.—He turns to each of the premises, and considers whether they are false, dubious, or equivocal; and is thus prepared and directed to expose every weak point in the argument with clearness, precision and method; and this to those who perhaps are wholly ignorant of the aids by which the speaker is thus enabled to carry conviction with his discourse." *Commentary on the Compendium of Logic, used in the University of Dublin.* Dublin, 1805.

† In most of the defences of the school logic which I have seen, the chief weapon employed has been that kind of argument which, in scholastic phraseology, is called the *Argumentum ad Hominem*; an argument in the use of which much regard to consistency is seldom to be expected.—In one sentence, accordingly, Bacon and Locke are accused of having never read Aristotle; and, in the next, of having borrowed from Aristotle the most valuable part of their writings.

With respect to Locke, it has been triumphantly observed, that his acquaintance with Aristotle's logic must have been superficial, as he has, in one of his objections, manifestly

It has, indeed, been asserted by an ingenious and learned writer, that "he has never met with a person unacquainted with logic, who "could state and maintain his argument with facility, clearness "and precision ;—that he has seen a man of the acutest mind puz-"zled by the argument of his antagonist ; sensible perhaps, that it "was inconclusive, but wholly unable to expose, the fallacy which "rendered it so : while a logician, of perhaps very inferior talents, "would be able at once to *discern* and to *mark* it."*

I do not deny that there may be some foundation for this statement. The part of Aristotle's Organon which seems, in the design, to be the most practically useful (although it is certainly very imperfect in the execution) is the book of sophisms ; a book which still supplies a very convenient phraseology for *marking* concisely some of the principal fallacies which are apt to impose on the understanding in the heat of a *viva voce* dispute.† Whether it affords any aid in detecting or *discerning* these fallacies may perhaps be doubted. But it is certainly an acquisition, and an acquisition of

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confounded *particular* with *singular* propositions. (Commentary on the Dublin Compendium.) The criticism I have no doubt, is just ; but does it, therefore, follow, that a greater familiarity with the technical niceties of an art which he despised, would have rendered this profound thinker more capable of forming a just estimate of its scope and spirit, or of its efficacy in aiding the human understanding?—Somewhat of the same description are the attempts which have been repeatedly made to discredit the strictures of Dr. Reid, by appealing to his own acknowledgment, that there might *possibly* be some parts of the Analytics and Topics, which he had never read The passage in which this acknowledgment is made, is so characteristical of the modesty and candour of the writer, that I am tempted to annex it to this note ;—more especially, as I am persuaded, that, with many readers, it will have the effect of confirming, rather than of shaking their confidence in the general correctness and fidelity of his researches.

"In attempting to give some account of the Analytics and of the Topics of Aristotle, ingenuity requires me to confess, that, though I have often proposed to read the whole with care, and to understand what is intelligible, yet my courage and patience always failed before I had done. Why should I throw away so much time and painful attention upon a thing of so little real use? If I had lived in those ages when the knowledge of Aristotle's Organon entitled a man to the highest rank in philosophy, ambition might have induced me to employ upon it some years of painful study, and less, I conceive, would not be sufficient. Such reflections as these always got the better of my resolution, when the first ardour began to cool. All I can say is, that I have read some parts of the books with care, some slightly, *and some perhaps* not at all. I have glanced over the whole often, and when any thing attracted my attention, have dipped into it till my appetite was satisfied Of all reading, it is the most dry and the most painful, employing an infinite labour of demonstration, about things of the most abstract nature, delivered in a laconic style, and often, I think, with affected obscurity ; and all to prove general propositions, which, when applied to particular instances, appear self-evident." Chap. III. sect. 1.

* Mr. Walker, author of the Commentary on the Dublin Compendium of Logic.

† Such phrases, for example, as 1. *Fallacia Accidentis.* 2. *A dicto secundum quid, ad dictum simpliciter.* 3. *Ab ignorantia Elenchi* 4 *A non causa pro causa.* 5 *Fallacia consequentis.* 6. *Petitio principii.* 7. *Fallacia plurium interrogationum, &c.*

I have mentioned those fallacies alone which are called by logicians *Fallaciae extra Dictionem* ; for as to those which are called *Fallaciae in Dictione* (such as the *Fallacia Aequivocationis Fallacia Amphiboliae, Fallacia Accentus vel Pronunciationis, Fallacia a Figura dictionis, &c.*) they are too contemptible to be deserving of any notice.—For some remarks on this last class of fallacies, see note (M.)

no contemptible value, to have always at hand a set of technical terms, by which we can point out to our hearers, without circumlocution or discussion, the vulnerable parts of our antagonist's reasoning. That nothing useful is to be learned from Aristotle's logic, I am far from thinking: but I believe that all which is useful in it might be reduced into a very narrow compass; and I am decidedly of opinion, that wherever it becomes a serious and favourite object of study, it is infinitely more likely to do harm than good. Indeed, I cannot help considering it as strongly symptomatic of some unsoundness in a man's judgment, when I find him disposed (after all that has been said by Bacon and Locke) to magnify its importance either as an inventive or as an argumentative Organ. Nor does this opinion rest upon theory alone. It is confirmed by all that I have observed, (if after the example of the author last quoted I may presume to mention the results of my own observations,) with respect to the intellectual characters of the most expert dialecticians whom I have happened to know. Among these, I can with great truth say, that although I recollect several possessed of much learning, subtlety and ingenuity, I can name none who have extended by their discoveries the boundaries of science; or, on whose good sense I should conceive that much reliance was to be placed in the conduct of important affairs.

Some very high authorities, I must, at the same time, confess, may be quoted on the opposite side of the question; among others, that of Leibnitz, unquestionably one of the first names in modern philosophy. But, on this point, the mind of Leibnitz was not altogether unwarped; for he appears to have early contracted a partiality, not only for scholastic learning, but for the projects of some of the schoolmen to reduce, by means of technical aids, the exercise of the discursive faculty to a sort of mechanical operation;—a partiality which could not fail to be cherished by that strong bias towards synthetical reasoning from abstract maxims, which characterizes all his philosophical speculations. It must be remembered, too, that he lived at a period, when logical address was still regarded in Germany as an indispensable accomplishment to all whose taste led them to the cultivation of letters or of science. Nor was this an accomplishment of easy acquisition; requiring, as it must have done, for its attainment, a long course of laborious study, and, for its successful display, a more than ordinary share of acuteness, promptitude, and invention. To all which it may be added, that while it remained in vogue, it must have been peculiarly flattering to the vanity and self-love of the possessor; securing to him, in every contest with the comparatively unskilful, an infallible triumph. These considerations, (combined with that attachment to the study of jurisprudence which he retained through life) may, I think, go far to account for the disposition which Leibnitz sometimes shews to magnify a little too much the value of this art. It is, besides, extremely worthy of remark, with respect to this eminent man, within what narrow limits he circumscribes the province of the school gic, notwithstanding the favourable terms in which he occasionally eaks of it. The following passage in one of his letters is particularly deserving of attention, as it confines the utility of syllogism those controversies alone which are carried on in writing, and ntains an explicit acknowledgment, that, in extemporaneous dissions, the use of it is equally nugatory and impracticable.

"I have myself experienced the great utility of the forms of logic in bringing controversies to an end; and wonder how it has happened, that they should have been so often applied to disputes where no issue was to be expected, while their real use has been altogether overlooked. In an argument which is carried on *viva voce*, it is scarcely possible that the *forms* should continue to be rigorously observed; not only on account of the tediousness of the process, but chiefly from the difficulty of retaining distinctly in the memory all the different links of a long chain. Accordingly, it commonly happens, that after one *prosyllogism*, the disputants betake themselves to a freer mode of conference. But if, in a controversy, carried on in writing, the legitimate forms were strictly observed, it would neither be difficult nor disagreeable, by a mutual exchange of syllogisms and answers, to keep up the contest,* till either the point to be proved was completely established, or the disputant had nothing farther to allege in support of it. For the introduction, however, of this into practice, many rules remain to be prescribed; the greater part of which are to be collected from the practice of lawyers."†

This concession, from so consummate a judge, I consider as of great nsequence in the present argument. For my own part, if I were alled on to plead the cause of the school logic, I should certainly hoose to defend, as the more tenable of the two posts, that which eibnitz has voluntarily abandoned. Much might, I think, on *this* round be plausibly alleged in its favour, in consequence of its obvious tendency to cultivate that invaluable talent to a disputant, which Aristotle has so significantly expressed by the word [illegible];‡—a talent of which the utility cannot be so forcibly pictured, as in the lively and graphical description given by Johnson, of he inconveniences with which the want of it is attended.

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* The words in the original are—"non ingratum nec difficile foret, mittendo remittendoque syllogismos et responsiones, *tamdiu reciprocare serram*, donec vel confectum it quod probandum erat, vel nihil ultra habeat quod afferat argumentator."

† Leibnitz. Op. Tom. VI. p. 72. Edit. Dutens.

‡ Aristotle's definition of *αγχινοια* turns upon *one* only of the many advantages which *esence of mind* bestows, in the management of a *vivâ voce* dispute. *Ηδ' αγχινοια εστιν ευστοχια τις εν ασκεπτῳ χρονῳ του μεσου.* (Sagacitas est bona quaedam medii njectatio brevissimo tempore.) Analyt. Post. Lib. i. cap. 34. I use the word, upon his occasion, in that extensive and obvious sense which its etymology suggests, and in which the corresponding Latin phrase is employed by Quinctilian. "In Altercatione opus st imprimis ingenio veloci ac mobili, *animo praesenti et acri*. Non enim cogitandum, sed icendum statim est." Quinct. Lib. vi. cap. 4.

"There are men whose powers operate only at leisure and in "retirement, and whose intellectual vigour deserts them in conver"sation; whom merriment confuses, and objection disconcerts; "whose bashfulness restrains their exertion, and suffers them not "to speak, till the time of speaking is past; or whose attention to "their own character makes them unwilling to utter, at hazard, "what has not been considered and cannot be recalled."[*]

The tendency however of scholastic disputations to cure these defects, it must not be forgotten, belongs to them only in common with all other habits of extemporaneous debate; and the question still recurs, Whether it would not be wiser to look for the remedy, in exercises more analogous to the real business of life?

After having said so much in disparagement of the art of syllogizing, I feel it incumbent on me to add, that I would not be understood to represent a general acquaintance with it as an attainment of no value, even in these times. The technical language connected with it is now so incorporated with all the higher departments of learning, that, independently of any consideration of its practical applications, some knowledge of its peculiar phraseology may be regarded as an indispensable preparation both for scientific and for literary pursuits.[†] To the philosopher, it must ever remain a subject of speculation peculiarly interesting, as one of the most singular facts in the history of the Human Understanding. The ingenuity and subtlety of the invention, and the comprehensive reach of thought displayed in the systematical execution of so vast a design, form a proud and imperishable monument to the powers of Aristotle's mind, and leave us only to regret, that they were wasted upon objects of so little utility. In no point of view, however, does this extraordinary man appear to rise so far above the ordinary level of the species, as when we consider the dominion which he exercised, during so long a succession of ages, over the opinions of the most civilized nations. Of this dominion the basis was chiefly laid in the syllogistic theory, and in the preparatory books on the Categories and on Interpretation; a part of his works to which he was more indebted for his authority in the schools than to all the rest put together. Is it extravagant to conjecture, that Aristotle himself foresaw this; and that, knowing how prone the learned are to admire what they do not comprehend, and to pride themselves on the possession of a mystical jargon, unintelligible to the multitude, he resolved to adapt himself to their taste in those treatises which were destined to serve, *in the first instance*, as the foundation of his fame? If such was really his idea, the event has shown how soundly he judged of human nature, in this grand experiment upon its weakness and ductility.[*]

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[*] Life of Dryden.

[†] It was with great pleasure I read the concluding paragraph of the introduction prefixed to a Compend of Logic, sanctioned by so learned a body as the University of Dublin.

"Utrum haecce ars per se revera aliquem praestet usum, quidam dubitavere. Quoniam vero in Authorum insigniorum scriptis saepe occurant termini Logici, hos terminos explicatos habere, ideoque et ipsius artis partes praecipuas omnino necessarium videtur. Haec itaque in sequenti compendio efficere est propositum."[‡]

(Artis Logicae Compendium. In usum Juventutis Collegii Dubliniensis.)

The arrangement of this department of academical study, proposed by M. Prévost of Geneva, seems to be very judiciously and happily imagined.

"*Dialecticam*, quae linguae philosophicae usum tradit, seorsim docere: et *logicam*, quae rationis analysin instituit, ab omni de verbis disputatione sejungere, visum est.

"*Logicam* autem in tres partes dividimus, de *veritate*, de *errore*, de *methodo*: ut haec mentis medicina, ad instar medicinae corporis, exhibeat ordine statum naturalem, morbos, curationem."[§]

See the preface to a short but masterly tract *De Probabilitate*, printed at Geneva, in 1794.

[‡] [Whether this art is of itself of any utility, some have doubted. Since however in the writings of the best authors, terms of logic often occur, to explain these and also the principal parts of the art, seems absolutely necessary.]

[§] [It seemed best to teach separately Dialectics; and to separate logic, which teaches the analysis of reason, from all disputes about words.]

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[*] The following historical sketch from *Ludovicus Vives* may serve to shew that the foregoing supposition is not altogether gratuitous. "A temporibus Platonis et Aristotelis usque ad Alexandrum Aphrodiseum, qui vixit Severo et ejus filiis Principibus, Aristoteles nominabatur magis, quam vel legebatur a doctis vel intelligebatur. Primus ille aggressus eum enarrare, et adjuvit studia multorum et ad alia in eo Philosopho quaerenda excitavit. Mansit tamen crebrior in manibus hominum et notior Plato, usque ad scholas in Galliis et Italia publice constitutas, id est, quam diu Graeca et Latina lingua viguerunt. Postea vero quum theatricae coeperunt esse disciplinae, omnisque earum fructus existimatus est, posse disputando fucum facere, et os obturare, et pulverem ob oculos jacere, idque imperitissima peritia, et nominibus ad lubitum confictis, accommodatiores ad rem visi sunt libri logici Aristotelis et physici *relictis permultis praeclaris ejus operibus:* Platone vero, et quod ab eis non intelligeretur, quamvis multo minus Aristoteles, et quod artificium videretur docere, ne nominato quidem; non quod minorem aut ineruditiorem putem Platone Aristotelem, sed quod ferendum non est, Platonem sanctissimum philosophum praeteriri, et Aristotelem ita legi, ut *meliore rejecta parte, quae retinetur id cogatur loqui, quod ipsi jubent.*"[†] Ludovic. Vives de Civ. Dei, L. viii. c. 10.

A remark similiar to this is made by Bayle. "Ce qui doit étonner le plus les hommes sages, c'est que les professeurs se soient si furieusement entêtez des hypotheses philosophiques d'Aristote. Si l'on avoit eu cette prévention pour sa poëtique, et pour sa rhétorique, il y auroit moins de sujet de s'étonner; mais, on s'est entêté du plus foible de ses ouvrages, je veux dire, de sa logique et de sa physique."[‡]—(Bayle, Art. *Aristote.*)

[†] [From the time of Plato and Aristotle, to that of Alexander Aphrodiseus, who lived when Severus and his sons were Emperors, Aristotle was rather spoken of, than either read or understood, by the learned. He first endeavoured to explain him, and both aided the studies of many, and excited to the reading of his other works. Yet Plato remained more known and read, even in the public schools in France and Italy; that is, as long as the Greek and Latin languages flourished. But after that the course of instruction became adapted rather for exhibition than improvement, and all the proficiency wished for, was to be able in disputation to raise a smoke, to stop the mouth, and throw dust in the eyes of an adversary; to this useless knowledge, and the fabrication of words at pleasure, the logical and physical works of Aristotle appeared best adapted; and many of his best works were neglected. Plato, in the mean time, and whatever else the learned could not understand, was wholly forgotten, though in fact they understood Aristotle still less. Not that I would have it supposed that I esteem Aristotle inferior to Plato; but it is intolerable that this last, the most noble of philosophers, should be wholly neglected, and that even of Aristotle they should reject the best and most valuable works, while, what they do retain, they compel to mean whatever they please.]

[‡] [What ought to astonish the wisest men is, that the professors should be so furiously enamoured of the philosophical hypotheses of Aristotle. If they had conceived this partiality for his poetics, or his rhetoric, it would have been less marvellous, but it is confined to his logic and *his physics*, that is, to the weakest of his productions.]

That Aristotle's works have of late fallen into general neglect, is a common subject of complaint among his idolaters. It would be nearer the truth to say, that the number of Aristotle's rational and enlightened admirers was never so great as at the present moment. In the same proportion, in which his logic has lost its credit, his ethics, his politics, his poetics, his rhetoric, and his natural history have risen in the public estimation. No similar triumph of genius is recorded in the Annals of Philosophy:—To subjugate, for so many centuries, the minds of men, by furnishing employment (unproductive as it was) to their intellectual faculties, at a time when the low state of experimental knowledge did not supply more substantial materials for their reasoning;—and afterwards, when at the distance of two thousand years, the light of true science began to dawn, to contribute so large a share to its growing splendour.

In the course of the foregoing animadversions on the syllogistic theory, I have proceeded on the supposition, that the whole glory of the invention belongs to Aristotle. It is proper, however, before dismissing the subject, to take some notice of the doubts which have been suggested upon this head, in consequence of the lights recently thrown on the remains of ancient science still existing in the East. Father Pons, a Jesuit missionary, was (I believe) the first person who communicated to the learned of Europe, the very interesting fact, that the use of the syllogism is, at this day, familiarly known to the Bramins of India;* but this information does not seem to have attracted much attention in England, till it was corroborated by the indisputable testimony of Sir William Jones, in his third discourse to the Asiatic Society.† "It will be sufficient (he observes) in this dissertation to assume, "what might be proved beyond controversy, that we now live "among the adorers of those very deities who were worshipped "under different names in old Greece and Italy, and among the "professors of those philosophical tenets, which the Ionic and Attic "writers illustrated with all the beauties of their melodious language. "On one hand we see the trident of Neptune, the eagle of Jupiter, "the satyrs of Bacchus, the bow of Cupid, and the chariot of the "Sun; on the other, we hear the cymbals of Rhea, the songs of the "Muses, and the pastoral tales of Apollo Nomius. In more retired "scenes, in groves, and in seminaries of learning, we may perceive "the *Brahmans* and the *Sermanes* mentioned by Clemens, *disputing* "*in the forms of logic*, or discoursing on the vanity of human enjoyments, on the immortality of the soul, her emanation from the "eternal mind, her debasement, wanderings, and final union with "her source. The six philosophical schools, whose principles are "explained in the *Dersana Sastra*, comprise all the metaphysics of "the old academy, the Stoa and the Lyceum; nor is it possible to

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* Lettres Edifiantes et Curieuses, Tome XXVI. (old edition.)—Tome XIV. edit. of 1781. The letter is dated 1740.

† Delivered in 1786.

"read the *Vedanta*, or the many fine compositions in illustration of it, without believing that Pythagoras and Plato derived their sublime theories from the same source with the sages of India."[*]

In a subsequent discourse, the same author mentions "a tradition, which prevailed, according to the well informed author of the *Dabistân*, in the *Panjâb*, and in several Persian provinces, that, among other Indian curiosities, which Callisthenes transmitted to his uncle, was *a technical system of logic*, which the Brahmans had communicated to the inquisitive Greek, and which the Mohammedan writer supposes to have been the ground-work of the famous Aristotelian method. If this be true, (continues Sir W. Jones,—and none will dispute the justness of his remark) it is one of the most interesting facts that I have met with in Asia."[†]

Of the soundness of the opinion concerning the origin of the Greek philosophy, to which these quotations give the sanction of an authority so truly respectable, our stock of facts is as yet too scanty to enable us to form a competent judgment. Some may perhaps think, that the knowledge of the Aristotelian logic which exists in India, may be sufficiently accounted for by the Mohammedan conquests; and by the veneration in which Aristotle was held, from a very early period, by the followers of the prophet.[‡] On

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[*] Works of Sir William Jones, Vol. I. p. 28.

In the same discourse, we are informed, that "the Hindoos have numerous works on grammar, *logic*, rhetoric, music, which are extant and accessible." An examination of these is certainly an object of literary curiosity, highly deserving of further attention.

[†] Eleventh discourse, delivered in 1794.

[‡] "La philosophie Péripatétique s'est tellement établie par tout, qu'on n'en lit plus d'autre par toutes les universitez Chrétiennes. Celles mêmes, qui sont contraintes de reçevoir les impostures de Mahomet, n'enseignent les sciences que conformément aux principes du Lycée, auxquels ils s'attachent si fort, qu' Averroes, Alfarabius, Albumassar, et assez d'autres philosophes Arabes se sont souvent éloignés des sentiments de leur prophête, pour ne pas contredire ceux d'Aristote, que les Turcs ont en leur idiome Turquesque et en Arabe, comme Belon le rapporte." (*La Motte le Vayer*; quoted by Bayle, Art. *Aristote*.)

"L'Auteur, dont j'emprunte ces paroles, dit dans un autre volume, que, selon la relation d'Olearius, les Perses ont toutes les oeuvres d'Aristote, expliquées par beaucoup de commentaires Arabes. 'Bergeron (dit il) remarque, dans son Traité des Tartares, qu'ils possedent les livres d'Aristote, traduits en leur langue, enseignant, avec autant de soumission qu'on peut faire ici, sa doctrine à Samarcand, université du Grand Mogol, et à présent ville capitale du Royaume d'Usbec.' "[§]

In the 8th volume of the Asiatic Researches, there is a paper by Dr. Balfour, containing some curious extracts (accompanied with an English version) from a Persian translation of an Arabic Treatise, entitled the "Essence of Logic." In the introduction to these the other hand, it must be acknowledged, that this part of Aristotle's work contains some intrinsic evidence of aid borrowed from a more ancient school. Besides that imposing appearance which it exhibits of systematical completeness in its innumerable details; and which we can scarcely suppose that it could have received from the original inventor of the art, there is a want of harmony or unity in some of its fundamental principles, which seems to betray a combination of different and of discordant theories. I allude more particularly to the view which it gives of the nature of science and of demonstration, compared with Aristotle's well-known opinions concerning the natural progress of the mind in the acquisition of knowledge. That the author of the Organon was fully aware of an incongruity so obvious, there can be little doubt; and it was not improbably with a view to disguise or to conceal it, that he was induced to avoid, as much as possible, every reference to examples, and to adopt that abstract and symbolical language, which might divert the attention from the inanity of his demonstrations, by occupying it in a perpetual effort to unriddle the terms in which they are expressed.

[§] [The Peripatetic philosophy is so much established every where, that they read no other in all the christian Universities. Those universities themselves who are constrained to receive the impostures of Mahomet, teach the sciences only in conformity with the principles of the Lyceum, to which they are so strongly attached, that Averroes, Alfarabius, Albumassar and many other Arabian Philosophers, often depart from the sentiments of their Prophet, that they may not contradict those of Aristotle; whom the Turks have in their Turkish and Arabian idiom; as Belon assures us.

The author, whose words I have quoted, says in another volume, that according to the relation of Olearius, the Persians have all the works of Aristotle, explained in many Arabian commentaries. Bergeron, says he, remarks, in his account of the Tartars, that they possess the works of Aristotle, translated into their own language, teaching, with as much authority as here, his doctrine at Samarcand, a university of the Great Mogul, and now the *capital city of the Kingdom of Usbec*.]

Nor does there seem to be any thing in these suggestions (which I hazard with much diffidence) inconsistent with Aristotle's own statement, in the concluding chapter of the book of sophisms. This chapter has indeed (as far as I know) been universally understood as advancing a claim to the whole art of syllogism;* but I must acknowledge, that it appears to me to admit of a very fair construction, without supposing the claim to comprehend *all* the doctrines delivered in the books of Analytics. In support of this idea, it may be remarked, that while Aristotle strongly contrasts the dialectical art, as taught in the preceding treatise, with the art of *disputation* as previously practised in Greece, he does not make the slightest reference to the distinction between demonstrative and dialectical syllogisms, or to those doctrines with respect to demonstration and science, which accord so ill with the general spirit of his philosophy. It does not seem, therefore, to be a very unreasonable supposition, that to these doctrines, (with which for many reasons he might judge it expedient to incorporate his own inventions

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extracts, Dr. Balfour mentions it as an indisputable fact, that "*the system of logic, generally ascribed to Aristotle, constitutes, at this time, the logic of all the nations of Asia who profess the Mahometan faith*;" and it seems to have been with a view of rendering this fact still more palpable to common readers, that the author has taken the trouble to translate, through the medium of the Persian, the Arabic original; from which language the knowledge of Aristotle's logic, possessed by the orientals, is supposed to have been derived.

* "The conclusion of this treatise (the book of Sophisms) ought not to be overlooked: it manifestly relates not to the present treatise only, but also to the whole Analytics and Topics of the author." Reid's Analysis, &c. Chap. v. sect. iii.

If I were satisfied that this observation is just, I should think that nothing short of the most irresistible evidence could be reasonably opposed to the direct assertion of Aristotle. It is quite inconceivable, that he should have wilfully concealed or misrepresented the truth, at a period, when there could not fail to be many philosophers in Greece, both able and willing to expose the deception.

and innovations,) he only gave that systematical and technical form, which, by its peculiar phraseology and other imposing appendages, was calculated at once to veil their imperfections, and to gratify the vanity of those who should make them objects of study. It is surely not impossible, that the syllogistic theory may have existed as a subject of abstract speculation, long before any attempt was made to introduce the syllogism into the schools as a weapon of controversy, or to prescribe rules for the skilful and scientific management of a *vivâ voce* dispute.

It is true that Aristotle's language, upon this occasion, is somewhat loose and equivocal; but it must be remembered, that it was addressed to his contemporaries, who were perfectly acquainted with the real extent of his merits as an inventor; and to whom, accordingly, it was not necessary to state his pretensions in terms more definite and explicit.

I shall only add, that this conjecture (supposing it for a moment to be sanctioned by the judgment of the learned) would still leave Aristotle in complete possession of by far the most ingenious and practical part of the scholastic logic;* while, at the same time,—should future researches verify the suspicions of Sir William Jones and others, that the first rudiments of the art were imported into Greece from the East,—it would contribute to vindicate his character against that charge of plagiarism, and of unfairness towards his predecessors, which has been admitted even by some who speak with the most unbounded reverence of his intellectual endowments.

From the logic of Aristotle, I now proceed to that of Lord Bacon; a logic which professes to guide us systematically in investigating the laws of nature, and in applying the knowledge thus acquired, to the enlargement of human power, and the augmentation of human happiness.

Of some of the fundamental rules by which this mode of philosophizing is more peculiarly distinguished, I intend to treat at considerable length;—directing my attention chiefly to such questions as are connected with the theory of our intellectual faculties. In this point of view, the author has left much to be supplied by his successors; the bent of his own genius having fortunately determined him rather to seize, by a sort of intuitive penetration, great practical results, than to indulge a comparatively sterile curiosity, by remounting to the first sources of experimental knowledge in the principles and laws of the human frame. It is to this humbler task that I propose to confine myself in the sequel. To follow him through the details of his Method, would be inconsistent with the nature of my present undertaking.

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* This was plainly the opinion of Cicero: "In hac arte (he observes, speaking of the dialectical art, as it was cultivated by the Stoics,) in hac arte, *si modo est haec ars*, nullum est praeceptum quomodo verum inveniatur, sed tantum est quomodo judicetur."—And in a few sentences after; "Quare istam artem totam dimittamus, quae in excogitandis argumentis muta nimium est, in judicandis nimium loquax."§ (De Orat. Lib ii. 38) The first sentence is literally applicable to the doctrine of syllogism considered theoretically: the second contrasts the inutility of this doctrine with the importance of such subjects as are treated of in Aristotle's Topics.

Whether Cicero and Quinctilian did not overrate the advantages to be derived from the study of the *Loci* as an organ of invention, is a question altogether foreign to our present inquiries. That it was admirably adapted for those argumentative and rhetorical displays which were so highly valued in ancient times, there can be no doubt, after what these great masters of oratory have written on the subject; but it does not follow, that, in the present state of society, it would reward the labours of those who wish to cultivate either the eloquence of the bar, or that which leads to distinction in our popular assemblies.

§ De Oratore, Lib. ii. 38. Boston edition, Vol. ii. p. 157, 158.

[In this art, if it be an art, no rule is given for discovering truth, but only for judging concerning it when discovered. . . . . . Wherefore let us dismiss the whole, as useless for invention, and too prolix in the discussion of arguments.]

CHAPTER FOURTH.

OF THE METHOD OF INQUIRY POINTED OUT IN THE EXPERIMENTAL OR INDUCTIVE LOGIC.

SECTION I.

Mistakes of the Ancients concerning the proper object of Philosophy.—Ideas of Bacon on the same subject.—Inductive Reasoning.—Analysis and Synthesis.—Essential difference between Legitimate and Hypothetical Theories.

I HAVE had occasion to observe more than once, in the course of the foregoing speculations, that the object of physical science is not to trace necessary connexions, but to ascertain constant conjunctions; *not* to investigate the nature of those efficient causes on which the phenomena of the universe ultimately depend, but to examine with accuracy what the phenomena are, and what the general laws by which they are regulated.

In order to save repetitions, I here beg leave to refer to some observations on this subject in the first volume. I request more particularly the reader's attention to what I have said, in the second section of the first chapter, on the distinction between *physical* and *efficient* causes; and on the origin of that bias of the imagination which leads us to confound them under one common name. That, when we see two events constantly conjoined as antecedent and consequent, our natural apprehensions dispose us to associate the idea of causation or efficiency with the former, and to ascribe to it that power or energy by which the change was produced, is a fact obvious and unquestionable; and hence it is, that in all languages, the series of physical causes and effects is metaphorically likened to a chain, the links of which are supposed to be indissolubly and necessarily connected. The slightest reflection, at the same time, must satisfy us that these apprehensions are inconsistent, and even absurd; our knowledge of physical events reaching no farther than to the laws which regulate their succession; and the words *power* and *energy* expressing attributes not of matter but of mind. It is by a natural bias or association somewhat similar, (as I have remarked in the section above mentioned) that we connect our sensations of colour with the primary qualities of body.*

This idea of the *object* of physical science (which may be justly regarded as the ground-work of Bacon's *Novum Organon*) differs essentially from that which was entertained by the ancients; according to whom "Philosophy is the science of *causes*." If, indeed by *causes* they had meant merely the constant forerunners or antecedents of events, the definition would have coincided nearly with the statement which I have given. But it is evident, that by *causes* they meant such antecedents as were *necessarily* connected with the effects, and from a knowledge of which the effects might be foreseen and demonstrated: And it was owing to this confusion between the proper objects of physics and of metaphysics, that, neglecting the observation of facts exposed to the examination of their senses, they vainly attempted, by synthetical reasoning, to deduce, as necessary consequences from their supposed causes, the phenomena and laws of nature.—"(1) Causa ea est," says Cicero, "quae id efficit "cujus est causa. Non sic causa intelligi debet, ut quod cuique "antecedat, id ei causa sit; sed quod cuique efficienter antecedat.— "Itaque dicebat Carneades ne Apollinem quidem posse dicere futu"ra, nisi ea, quorum causas natura ita contineret, ut ea fieri neces"se esset. Causis enim efficientibus quamque rem cognitis, posse "denique sciri quid futurum esset.†

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* Were it not for this bias of the imagination to identify efficient with physical causes, the attention would be continually diverted from the necessary business of life, and the useful exercise of our faculties suspended, in a fruitless astonishment at that hidden machinery, over which nature has drawn an impenetrable veil. To prevent this inconvenient distraction of thought, a farther provision is made in that gradual and imperceptible process by which the changes in the state of the Universe are, in general, accomplished. If an animal or a vegetable were brought into being before our eyes, in an instant of time,—the event would not be in itself more wonderful than their slow growth to maturity from an embryo, or from a seed. But, on the former supposition, there is no man who would not perceive and acknowledge the immediate agency of an intelligent cause; whereas, according to the actual order of things, the effect steals so insensibly on the observation, that it excites little or no curiosity, excepting in those who possess a sufficient degree of reflection to contrast the present state of the objects around them, with their first origin, and with the progressive stages of their existence.

† De Fato, 48, 49. The language of Aristotle is equally explicit. Επιστασθαι δε οιομεθα εκαστον απλως, αλλα μη τον σοφιστικον τροπον, τον κατα συμβεβηκος, όταν την τ' αιτιαν οιωμεθα γινωσκειν, δι' ἡν το πραγμα εστιν, ότι εκεινου αιτια εστι, και μη ενδεχεται τουτ' αλλως εχειν. Sciri autem putamus unamquamque rem simpliciter non

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(1) De Fato, 14, 15. (Boston edit. Vol. XVI. p. 168, 169)
[The cause is that, which produces that of which it is the cause. Cause ought not to be understood of that, which *precedes* that of which it is the cause; but of that which *efficiently precedes* it. Therefore Carneades said, that not even Apollo could foretel future events, unless such whose causes are so contained in nature, that they must necessarily happen. For when the efficient cause of any thing is known, we can then know what will take place.]

From this disposition to confound efficient with physical causes, may be traced the greater part of the theories recorded in the history of philosophy. It is this which has given rise to the attempts, both in ancient and modern times, to account for all the phenomena of moving bodies by means of *impulse*;[*] and it is this also which has suggested the simpler expedient of explaining them by the agency of *minds* united with the particles of matter.[†] As the communication of motion by apparent impulse, and our own power to produce motion by a volition of the mind, are two facts, of which, from our earliest infancy, we have every moment had experience; we are apt to fancy that we understand perfectly the *nexus* by which cause and effect are here necessarily conjoined;

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sophistico modo, id est ex accidenti, cum putamus causam cognoscere propter quam res est, ejus rei causam esse, nec posse eam aliter se habere.[‡]—Analyt. Poster. Lib i. cap. 2.

Nothing, however, can place in so strong a light Aristotle's idea of the connexion between physical causes and effects, as the analogy which he conceived it to bear to the connexion between the links of a mathematical chain of reasoning. Nor is this mode of speaking abandoned by his modern followers. "To deny a first cause (says Dr. Gillies) is to deny all causation: to deny axioms, is *for the same reason*, to deny all demonstration." (Vol. I. p. 108.) And in another passage: "We know a mathematical proposition, when we know the causes that make it true. In demonstration, the premises are the causes of the conclusion, and therefore prior to it. We cannot, therefore, demonstrate things in a circle, supporting the premises by the conclusion; because this would be to suppose, that the one proposition could be both prior and posterior to the other." (Ibid. p. 96.) Can one mathematical theorem be said to be prior to another in any other sense, than in respect of the order in which they are first presented to our knowledge?

[*] See Philosophy of the Human Mind, Vol. I. Chap. i. sect. 2.

With respect to the connexion between impulse and motion, I have the misfortune to differ from my very learned and highly respected friend M. Prévost of Geneva; whose opinions on this point may be collected from the two following sentences. "La cause diffère du simple signe précurseur, par sa force, ou son energie productive.—L'impulsion est un phénomène si commun, soumis à des lois si bien discutées, et si universelles, que toute cause qui s'y réduit semble former une classe éminente, et mériter seule le nom d' *Agent*."[§] (*Essais de Philosophie*, Tome II. pp. 174. 175.)

I have read with great attention all that M. Prévost has so ingeniously urged in vindication of the theory of his illustrious countryman Le Sage; but without experiencing that conviction which I have in general received from his reasonings. The arguments of Locke and Hume on the other side of the question appear to my judgment, the longer I reflect on them, the more irresistible; not to mention the powerful support which they derive from the subsequent speculations of Boscovich. (See *Locke's Essay*, B. II. chap. 23, § 28. 29. and *Hume's Essay on Necessary Connexion*, Part I.)

In employing the word *misfortune*, on this occasion, I have no wish to pay an unmeaning compliment; but merely to express the painful diffidence which I always feel in my own conclusions, when they happen to be at variance with those of a writer equally distinguished by the depth and by the candour of his philosophical researches.

For some additional illustrations of M. Prévost's opinion on this subject, see Appendix.

[†] To this last class of theories may also be referred the explanations of physical phenomena by such causes as sympathies, antipathies, Nature's horrour of a void, &c. and other phrases borrowed by analogy from the attributes of animated beings.

[‡] [We believe that any thing may be known simply, not sophistically, from circumstances, when we think we know that the cause, on account of which it exists, is the cause of that thing; and that it cannot have any other.]

[§] [Cause differs from the simple preceding sign, by its own force or productive energy. Impulse is a phenomenon so common, subject to laws so well ascertained, and so universal, that every one which is reduced to these, appears to form a distinct class, and alone merits the name of *Agent*.]

and it requires a good deal of reflection to satisfy us that, in both cases, we are as completely in the dark, as in our guesses concerning the ultimate causes of magnetism or of gravitation. The dreams of the Pythagorean school, with respect to analogies or harmonies between the constitution of the universe, and the mathematical properties of figures and of numbers, were suggested by the same idea of *necessary* connexions existing among physical phenomena, analogous to those which link together the theorems of geometry or of arithmetic; and by the same fruitless hope of penetrating, by abstract and synthetical reasoning, into the mysterious processes of nature.

Beside this universal and irresistible bias of the imagination, there were some peculiarities in the genius and scientific taste of Aristotle, which gave birth to various errours calculated to mislead his followers in their physical inquiries. Among these errours may be mentioned, as one of the most important, the distinction of causes (introduced by him) into the efficient, the material, the formal, and the final;—a distinction which, as Dr. Reid justly observes, amounts only (like many other of Aristotle's) to an explanation of the different meanings of an ambiguous word; and which, therefore, was fitter for a dictionary of the Greek language, than for a philosophical treatise.[*] Of the effect of this enumeration of causes in distracting the attention, some idea may be formed, when it is recollected, that according to Aristotle, it is the business of the philosopher to reason demonstratively from all the four.[†]

The same predilection of Aristotle for logical or rather verbal subtilties, encouraged, for many ages, that passion for fanciful and frivolous distinctions, which is so adverse to the useful exercise of the intellectual powers. Of its tendency to check the progress of physical knowledge, the reader will be enabled to judge for himself, by perusing the 16th and 17th chapters of Mr. Harris's Philosophical Arrangements; which chapters contain a very elaborate and not inelegant view of what the author is pleased to call the ancient *Theory of Motion*. A later writer of the same school has even gone so far as to assert, that it is such researches alone which merit the title of the Philosophy of Motion; and that the conclusions of Galileo and of Newton,—amounting (as they unquestionably do) to nothing more than a classification and generalization of facts,—deserve no higher an appellation than that of *Natural History*.[‡]

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[*] Analysis of Aristotle's Logic. Chap. ii. sect. 3.

[†] Nat. Auscult. Lib. ii. cap. 7.

[‡] Ancient Metaphysics, *passim*.—The censure bestowed on Aristotle's Physics, by the authors of the French Treatise of Logic, entitled *L'Art de Penser*, is judicious and discriminating. "Le principal défaut qu'on y peut trouver, n'est pas qu'elle soit fausse, mais c'est au contraire qu'elle est trop vraie, et qu'elle ne nous apprend que des choses qu'il est impossible d'ignorer."[§]

[§] [The principal fault we find in it, is not, that it is false, but that it is too true; and that it teaches us nothing but those things of which it is impossible we should be ignorant.]

In contrasting, as I have now done, the spirit of Bacon's mode of philosophizing with that of the ancients, I do not mean to extol his own notions concerning the relation of cause and effect in physics, as peculiarly correct and consistent. On the contrary, it seems to me evident, that he was led to his logical conclusions, not by any metaphysical analysis of his ideas, but by a conviction, founded on a review of the labours of his predecessors, that the plan of inquiry by which they had been guided must have been erroneous. If he had perceived, as clearly as Barrow, Berkeley, Hume, and many others have done since his time,[*] that there is not a single instance in which we are able to trace a necessary connexion between two successive events, or to explain in what manner the one follows from the other as an infallible consequence, he would have been naturally led to state his principles in a form far more concise and methodical, and to lay aside much of that scholastic jargon by which his meaning is occasionally obscured. Notwithstanding, however, this vagueness and indistinctness in his language, his comprehensive and penetrating understanding, enlightened by a discriminating survey of the fruitless inquiries of former ages, enabled him to describe, in the strongest and happiest terms, the nature, the object, and the limits of philosophical investigation. The most valuable part of his works, at the same time, consists, perhaps, in his reflections on the errours of his predecessors; and on the various causes which have retarded the progress of the sciences and the improvement of the human mind. That he should have executed, with complete success, a system of logical precepts for the prosecution of experimental inquiries, at a period when these were, for the first time, beginning to engage the attention of the curious, was altogether impossible; and yet in his *attempt* towards this undertaking, he has displayed a reach of thought and a justness of anticipation, which, when compared with the discoveries of the two succeeding centuries, seem frequently to partake of the nature of prophecy. "(1) Prout Physica majora indies incrementa capiet, et nova axiomata educet, eo mathematicae novâ operâ in multis indigebit, et "plures demum fient mathematicae mixtae."* Had he foreseen all the researches of the Newtonian school, his language could not have been more precise or more decided.

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[*] In alluding to the relation between cause and effect, Bacon sometimes indulges his fancy in adopting metaphorical and popular expressions. "Namque in limine Philosophiae, cum secundae causae, tanquam sensibus proximae, ingerant se menti humanae, mensque ipsa in illis haereat, atque commoretur, oblivio primae causae obrepere possit. Sin quis ulterius pergat, *causarumque dependentiam, seriem, et concatenationem*, atque opera providentiae intueatur, tunc secundum poetarum mythologiam, facile credet, *summum naturalis catenae annulum* pedi solii Jovis affigi."[†] (De Aug. Scient. Lib. i.) This is very nearly the language of Seneca. "Cum fatum nihil aliud sit quam *series implexa causarum*, illa est prima omnium causa ex quâ ceterae pendent."[‡]

In other instances, he speaks (and, in my opinion, much more philosophically) of the "opus quod operatur Deus a primordio usque ad finem;"[§] a branch of knowledge which he expressly describes as placed beyond the examination of the human faculties. But this speculation, although the most interesting that can employ our thoughts, has no immediate connexion with the logic of physical science.—See note (N.)

[†] [For at the threshold of philosophy, when second causes, perceptible by the senses, force themselves upon the mind; and this rests upon and clings to them, an oblivion of the first cause may creep in. But if we go further, and view the dependence, series, and concatenation of causes, and the works of providence, then, according to poetic mythology, we shall easily perceive, that the most elevated ring of the chain of nature is fastened to the foot of the throne of Jove.]

[‡] [Since fate is nothing else than an *involved series of causes*, that is, the first cause of all, from which the rest depend.]

[§] [The work which God works from the beginning to the end of the creation.]

"Bacon (it has been observed by Mr. Hume) was ignorant of geometry; and only pointed out at a distance the road to true philophy."—"As an author and philosopher," therefore, this historian pronounces him, "*though very estimable*, yet inferiour to his contemporary Galileo, perhaps even to Kepler."†—The parallel is, by no means, happily imagined: in as much as the individuals whom it brings into contrast, directed their attention to pursuits essentially different, and were characterized by mental powers unsusceptible of comparison. As a geometer or astronomer, Bacon has certainly no claim whatever to distinction; nor can it even be said, that, as an experimentalist, he has enriched science by one important discovery: but, in just and enlarged conceptions of the proper aim of philosophical researches, and of the means of conducting them, how far does he rise above the level of his age! Nothing, indeed, can place this in so strong a light, as the history of Kepler himself; unquestionably one of the most extraordinary persons who adorned that memorable period, but deeply infected, as his writings shew, with prejudices borrowed from the most remote antiquity. The mysterious theories of the Pythagoreans which I formerly mentioned, and which professed to find in the mathematical properties of figures and numbers, an explanation of the system of the universe, seem, from one of his earlier publications, to have made a strong impression on his imagination;‡ while, at an after period of life, he in-

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[*] De Aug. Scient. Lib. iii. cap. vi.

By the word *Axiom*, Bacon means a general principle obtained by induction, from which we may safely proceed to reason synthetically. It is to be regretted, that he did not make choice of a less equivocal term, as Newton has plainly been misled by his example, in the very illogical application of this name to the laws of motion, and to those general *facts* which serve as the basis of our reasonings in catoptrics and dioptrics. (See p. 30, of this volume.)

I shall take this opportunity to remark, that Newton had evidently studied Bacon's writings with care; and has followed them (sometimes too implicitly) in his logical phraseology. Of this remark various other proofs will occur afterwards.

[†] History of England. Appendix to the reign of James I.

[‡] *Mysterium Cosmographicum*, de admirabili proportione orbium coelestium deque causis coelorum numeri, magnitudinis, motuumque periodicorum genuinis et propriis, *demonstratum per quinque regularia corpora Geometrica*, 1598.§ Kepler informs us, that he sent

[§] [The Cosmographical Mystery, on the admirable proportion of the celestial orbs, and on the real and proper causes of the number, magnitude, and periodical motions of the heavens, demonstrated by five regular geometrical figures.]

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(1) [As physical science will daily acquire a greater increase, and bring forth new axioms, so it will need in many things more aid from mathematics, and the divisions of mixt mathematics will *become more numerous*.]

dulged himself in a train of thinking about the *causes* of the planetary motions, approaching to the speculations of the late learned author of *Ancient Metaphysics*.

"(1) Nego (says he, in his Commentaries on the planet MARS) "ullum motum perennem *non rectum* a Deo conditum esse praesidio "mentali destitutum.—Hujus *motoris* manifestum est duo fore munia; "alterum ut facultate polleat transvectandi corporis; alterum ut scientiâ praeditus sit inveniendi circularem limitem per illam puram aur"ram aetheriam nullis hujusmodi regionibus distinctam."—In another part of his work, he seriously gives it as his opinion, that the minds of the planets must have a power of making constant observations on the sun's apparent diameter, that they may thereby be enabled

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a copy of this book to Tycho Brahe; the subject of whose answer he has had the candour to record. "Argumentum literarum Brahei hoc erat, ut suspensis speculationibus à priori descendentibus, animum potius ad observationes quas simul offerebat considerandas adjicerem, inque iis primo gradu facto, posteà demum ad causas ascenderem."* To this excellent advice the subsequent discoveries, which have immortalized the name of Kepler, may, (in the opinion of Mr. Maclaurin) be ascribed. *Account of Newton's Discoveries*, Book 1. Chap. iii.

An aphorism of Lord Bacon, concerning the relation which Mathematics bears to Natural Philosophy, exhibits a singular contrast to the aim and spirit of the *Mysterium Cosmographicum*. "In secunda schola Platonis, Procli et aliorum, Naturalis Philosophia infecta et corrupta fuit per Mathematicam; *quae Philosophiam Naturalem terminare, non generare aut procreare debet.*"† (Nov. Org Lib. I. Aphor xcvi.)—The very slender knowledge of this science which Bacon probably possessed, renders it only the more wonderful, that he should have been so fortunate in seizing, or rather in divining its genuine use and application, in physical researches.

The ignorance of geometry with which Mr. Hume reproaches Bacon, will not appear surprising, when it is considered, that sixty years after the time when he left Cambridge, mathematical studies were scarcely known in that University. For this fact we have the direct testimony of Dr. Wallis (afterwards Astronomical Professor at Oxford,) who was admitted at Emanuel College, Cambridge, in 1632; and who informs us, that at that time, "Mathematics were scarce looked upon as *Academical* Studies, but rather *Mechanical*; as the business of traders, merchants, seamen, carpenters, surveyors of land, and almanack-makers in London."—"Among more than two hundred students in our College, I do not know of any two who had more than I (if so much) which was then but little; and but very few in that whole University. For the study of Mathematics was then more cultivated in London than in the Universities."

(See *an Account of some passages in the Life of Dr. Wallis*, written by himself when he was upwards of eighty, and published by Hearne, in his edition of Langtoft's Chronicle.)

The same writer, from whom this information is derived, lived to see, not only the institution of the Royal Society of London, but the illustration which the University of Cambridge derived from the names of Barrow and of Newton; and even survived, for seventeen years, the publication of Newton's *Principia*.—That Lord Bacon's writings contributed, more than any other single cause, to give this sudden impulse to science in England, it is impossible to doubt.

* [The advice of Brahe in his letters was this; that omitting all *a priori* speculations, I should rather apply my mind to observations, some of which he specified; and having laid the first steps in these, I should then ascend to their causes.]

† [In the later school of Plato, Proclus, and others, Natural Philosophy was enfeebled and corrupted by Mathematics; which ought to terminate natural philosophy, not to generate and produce it.]

(1) [I deny that any perpetual motion, in any other than a direct line, hath been ordained by the Deity, destitute of the direction of an intelligent mind. Of this motive principle there are clearly two offices; the first, that it have the ability to carry the body along; the other, that it be endued with knowledge sufficient to find the limit of its circle in that pure ethereal essence, which is not marked like ours by any distinguishable division.]

so to regulate their motions, as to describe areas proportional to the times. "(1) Credibile est itaque si quâ facultate praediti sint *motores* illi observandae hujus diametri, eam tanto esse argutiorem quam sunt oculi nostri quanto opus ejus et perennis motio nostris turbulentis et confusis negotiis est constantior.

"An ergo binos singulis planetis tribues oculos, Keplere! Nequaquam. Neque est necesse. Neque enim ut moveri possint, pedes ipsis atque alae sunt tribuendae."

From such extravagancies as these, how wide the transition to the first sentence of the Novum Organon! "(2) HOMO NATURAE MINISTER ET INTERPRES TANTUM FACIT ET INTELLIGIT, QUANTUM DE NATURAE ORDINE RE VEL MENTE OBSERVAVERIT NEC AMPLIUS SCIT AUT POTEST."

In calling man the *interpreter* of Nature, Bacon had plainly the same idea of the object of physics, which I attempted to convey, when I said, that what are commonly called the *causes* of phenomena, are only their established antecedents or *signs*; and the same analogy which this expression suggests to the fancy, has been enlarged upon at considerable length, by the inventive and philosophical Bishop of Cloyne, as the best illustration which he could give of the doctrine in question. It would be difficult, indeed, to select another equally apposite and luminous; and not less difficult to find an author equally qualified to avail himself of its aid. I shall make no apology, therefore, for borrowing his words.

"There is a certain analogy, constancy, and uniformity in the phenomena or appearances of nature, which are a foundation for general rules; and these are a grammar for the understanding of nature, or that series of effects in the visible world, whereby we are enabled to foresee what will come to pass in the natural course of things. Plotinus observes, in his third Ennead, that the art of presaging is, in some sort, the reading of natural letters denoting order; and that so far forth as analogy obtains in the universe, there may be vaticination. And in reality, he that foretells the motions of the planets, or the effects of medicines, or the results of chemical or mechanical experiments, may be said to do it by natural vaticination.

"We know a thing when we understand it, and we understand it when we can interpret or tell what it signifies. Strictly the sense knows nothing. We perceive indeed sounds by hearing, and characters by sight; but we are not therefore said to understand them. After the same manner, the phenomena of nature are alike

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(1) [We may then believe, that if these *movers* are endued with a power of observing this diameter, this power is as much more subtile than our eyes, as its office and perpetual motion are more regular than the confusion and irregularity of the turbulent scene in which we reside.

Do you then, Kepler, give to each of the planets two eyes? By no means; nor do they need them; any more than they do wings or feet upon which to move]

(2) [Man as the minister and interpreter of nature, performs and understands so much only, as according to his circumstances and intelligence he can comprehend of the order of nature; beyond this neither his knowledge nor ability extends.]

"visible to all; but all have not alike learned the connexion of natural signs, or understand what they signify, or know how to vaticinate by them. There is no question, says Socrates in *Theaetetus*, "concerning that which is agreeable to each person, but concerning what will in time to come be agreeable, of which all men are not equally judges. He that foreknoweth what will be, in every kind, is the wisest. According to Socrates, you and the cook may judge of a dish on the table equally well; but while the dish is making, the cook can better foretell what will ensue from this or that manner of composing it. Nor is this manner of reasoning confined only to morals or politics, but extends also to natural science.

"As the natural connexion of signs with the things signified is regular and constant, it forms a sort of rational discourse, and is therefore the immediate effect of an intelligent cause."*

The same language with respect to the office and use of philosophy has been adopted by Reid, and at a much earlier period by Hobbes; and it was evidently by a similar train of thinking (as I already hinted) that Bacon was led to call philosophy *the interpretation of nature.*

According to the doctrine now stated, the highest, or rather the only proper object of Physics, is to ascertain those established conjunctions of successive events, which constitute the order of the Universe; to record the phenomena which it exhibits to our observations, or which it discloses to our experiments; and to refer these phenomena to their general laws. While we are apt to fancy, therefore, (agreeably to popular conceptions and language) that we are investigating efficient causes, we are, in reality, only generalizing effects; and when we advance from discovery to discovery, we do nothing more than resolve our former conclusions into others still more comprehensive. It was thus that Galileo and Torricelli proceeded in proving that all terrestrial bodies gravitate towards the earth; and that the apparent levity of some of them is merely owing to the greater gravity of the atmosphere. In establishing this important conclusion, they only generalized the law of gravity, by reconciling with it a variety of seeming exceptions; but they threw no light whatever on that mysterious power, in consequence of which all these phenomena take place.

In like manner, when Newton shewed that the same law of gravity extends to the celestial spaces; and that the power by which the moon and planets are retained in their orbits is precisely similar in its effects to that which is manifested in the fall of a stone,—he left the efficient cause of gravity as much in the dark as ever, and only generalized still farther the conclusions of his predecessors. It was, indeed, the most astonishing and sublime discovery which occurs in the history of science;—a discovery not of less consequence in Natural Religion than in Natural Philosophy,—and which

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* *Siris*: or a Chain of Philosophical Reflections and Inquiries concerning the virtues of Tar-Water, §§ 252, 253, 254.

ice demonstrated (in direct contradiction to all the ancient sys-
) that the phenomena exhibited by the heavenly bodies, are re-
ted by the same laws which fall under our observation on the
ice of this globe. Still, however, it was not the discovery of an
ient cause, but only the generalization of a fact.*

rom what has been said, it is sufficiently evident, that the *ulti-*
object which the philosopher aims at in his researches is pre-
ly the same with that which every man of plain understanding,
ever uneducated, has in view, when he remarks the events
ch fall under his observation, in order to obtain rules for the fu-
regulation of his conduct. The more knowledge of this kind
acquire, the better can we accommodate our conduct to the
blished course of things; and the more are we enabled to avail
elves of natural agents as instruments for accomplishing our
poses. It is with truth, therefore, that Bacon so often repeats,
"every accession which Man gains to his knowledge, is also an
cession to his power; and extends the limits of his empire over
e world which he inhabits."

he knowledge of the philosopher differs from that information
ch is the fruit of common experience, not in kind, but in degree.
latter is, in general, confined to such facts as present them-
es spontaneously to the eye: and so beautifully is the order of
re adapted to our wants and necessities, that while those laws
hich we are most deeply interested are obtruded on our notice
a our earliest infancy, others are more or less removed from the
ediate examination of our senses, to stimulate curiosity, and to
ent a reward to industry. That a heavy body, when unsupport-
will fall downwards; that a painful sensation would be felt, if the
were punctured or lacerated; that life might be destroyed by
ging into a river, or by throwing one's self headlong from a
ipice, are facts as well known to the savage as to the philoso-
r, and of which the ignorance would be equally fatal to both.
acquiring this, and other information of the same sort, little else
quisite than the use of our perceptive organs: And accordingly,
familiar to every man, long before the period that, in his matu-
years, falls under the retrospect of memory.

"The laws of attraction and repulsion are to be regarded as laws of motion, and these
as rules or methods observed in the production of natural effects, the efficient and
causes whereof are not of mechanical consideration. Certainly if the explaining a
nomenon be to assign its proper efficient and final cause, it should seem the mechanical
sophers never explained any thing; their province being only to discover the laws of
e; that is, the general rules and methods of motion; and to account for particular
omena, by reducing them under, or shewing their conformity to such general rules."—
eley's *Siris.*

he words *attraction* and *repulsion* may, in compliance with custom, be used where,
ately speaking, motion alone is meant"—"Attraction cannot produce, and in that
account for, the phenomena; being itself one of the phenomena produced and to be
nted for." Ibid.

r some very important as well as refined observations on the respective provinces of
ies and of metaphysics in the theory of motion, see a Tract by Dr. Berkeley, first
shed at London in 1721. The title is, *De Motu; sive de Motus principio et natura,
causa communicationis Motuum.*

For acquiring a knowledge of facts more recondite, *observation* and *experiment* must be employed;[*] and, accordingly, the use of these *media* forms one of the characteristical circumstances by which the studies of the philosopher are distinguished from the experience of the multitude. How much the stock of his information must thereby be enlarged is sufficiently manifest. By habits of scientific attention, his accuracy as an observer is improved; and a precision is given to his judgment, essentially different from the vagueness of ordinary perception: by a combination of his own observations with those made by others, he arrives at many conclusions unknown to those who are prevented, by the necessary avocations of human life, from indulging the impulse of a speculative curiosity; while the experiments which his ingenuity devises, enable him to place nature in situations in which she never presents herself spontaneously to view, and to extort from her, secrets, over which she draws a veil to the eyes of others.[†]

[*] To these, Condorcet adds *calculation*. "Bacon (he observes) has revealed the true method of studying nature, by employing the three instruments with which she has furnished us for the discovery of her secrets,—observation, experiment, and calculation." (*Tableau Historique des progrès de l'Esprit Humain.*) In this enumeration, it appears to me that there is a great defect, in point of logical distinctness. Calculation is certainly not an instrument of discovery at all analogous to experiment and observation: it can accomplish nothing in the study of nature, till they have supplied the materials; and is indeed only one of the many arts by which we are enabled to give a greater degree of accuracy to their results. The use of optical glasses; of the thermometer and barometer; of time-pieces; and of all the various instruments of practical geometry might, with equal propriety, have been added to the list.

The advantages, at the same time, which Natural Philosophy has derived, in modern times, from the arithmetical precision thus given to scientific details, must be allowed to be immense; and they would be well entitled to an ample illustration in a system of inductive logic. To those who may wish to prosecute the subject in this view, I would beg leave to suggest the word *mensuration* as equally precise, and more comprehensive, than the word *calculation*, as employed by Condorcet.

[†] These primary and essential organs of accurate information (*observation* and *experiment*) which furnish the basis to the whole superstructure of physical science, are very clearly and concisely described by *Boscovich*, in one of his notes on Stay's poem *De Systemate Mundi*. "*Observationes* fiunt spectando id quod natura per se ipsam sponte exhibet: hujusmodi sunt observationes pertinentes ad astronomiam et historiam naturalem. *Experimenta* fiunt ponendo naturam in eas circumstantias, in quibus debeat agere et nobis ostendere id quod quaerimus, quod pertinet ad physicam experimentalem. Porro et ferro et igni utimur, ac dissolvimus per vim compagem corporum, potissimum in chemiâ, et naturam quodammodo velut torquentes cogimus revelare sua secreta."[‡]

I have elsewhere remarked, that the physical discoveries of the moderns have been chiefly owing to the skilful contrivance and conduct of *experiments*; and that this method of interrogating nature was, in a great measure, unknown to the ancients. (*Philosophical Essays*, 4to. p. xxxv.) Even Aristotle himself is acknowledged, by one of his most devoted admirers, to have confined himself chiefly to *observation*; and is, on this very ground, proudly contrasted with the empirical experimentalists of the present times. "Aristotle (says Dr. Gillies) was contented with catching nature in the fact, without attempting, after the modern fashion, to put her to the torture; and in rejecting experiments operose, toilsome, or painful, either to their objects or their authors, he was justified by the habits of thinking, almost universally prevalent in his age and country. Educated in free and

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[‡] [*Observations* are made by beholding what nature exhibits of her own accord; of this kind are observations pertaining to astronomy and natural history. Experiments are made by placing nature in circumstances in which she must necessarily act, and show us what we seek. This belongs to experimental philosophy. We moreover make use of iron and fire, and dissolve by their means the union of bodies, especially in chemistry, and compel nature as it were by torture, to reveal her secrets.]

But the observations and experiments of the philosopher are commonly only a step towards a farther end. This end is, *first*, to resolve particular facts into other facts more simple and comprehensive: and, *secondly*, to apply these general facts (or, as they are usually called, these *laws of nature*) to a synthetical explanation of particular phenomena. These two processes of the mind, together with that judicious employment of observation and experiment which they presuppose, exhaust the whole business of philosophical investigation; and the great object of the rules of philosophizing is, to show in what manner they ought to be conducted.

1. For the more complete illustration of this fundamental doctrine, it is necessary for me to recur to what has been already stated with respect to our ignorance of *efficient causes*. As we can, in no instance, perceive the link by which two successive events are connected, so as to deduce, by any reasoning *a priori*, the one from the other as a consequence or effect, it follows, that when we see an event take place which has been preceded by a combination of different circumstances, it is impossible for human sagacity to ascertain whether the effect is connected with *all* the circumstances, or only with a *part* of them; and (on the latter supposition) which of the circumstances is essential to the result, and which are merely acci-

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martial republics, careless of wealth, because uncorrupted by luxury, the whole tribe of ancient philosophers dedicated themselves to agreeable only and liberal pursuits, with too proud a disdain of arts merely useful or lucrative. They ranked with the first class of citizens; and as such, were not to be lightly subjected to unwholesome or disgusting employments. To bend over a furnace, inhaling noxious steams, to torture animals, or to touch dead bodies, appeared to them operations not more misbecoming their humanity, than unsuitable to their dignity. For such discoveries as the beating and mixing of bodies offers to inquisitive curiosity, the naturalists of Greece trusted to slaves and mercenary mechanics, whose poverty or avarice tempted them to work in metals and minerals; and to produce, by unwearied labour, those coloured and sculptured ornaments, those gems, rings, cups, and vases, and other admired but frivolous elegancies, of which (in the opinion of good judges of art) our boasted chemistry cannot produce the materials; nor, were the materials at hand, supply us with the instruments fit to shape. The work-shops of tradesmen then revealed those mysteries which are now sought for in colleges and laboratories; and useful knowledge, perhaps, was not the less likely to be advanced, while the arts were confined to artists only; nor facts the more likely to be perverted, in order to support favourite theories, before the empiric had yet assumed the name, and usurped the functions of the philosopher." (Translation of Aristotle's Ethics and Politics, Vol. I. p. 161. 2d ed.)

In another passage, we are told by the same author, that "the learning of Greece properly terminates in the Stagirite. by whom it was finally embodied into one great work; *a work rather impaired than improved by the labours of succeeding ages.*" (Ibid. p. x. of the Preface.)

Notwithstanding the length of this note, I must beg leave to add to it a short extract from one of the aphorisms of Lord Bacon.—"Of the *criteria* for guiding our judgment among so many different and discordant schools, there is none more to be relied on, than that which is exhibited by their *fruits*; for the fruits of any speculative doctrine, or the inventions which it has really produced, are, as it were, sponsers or vouchers for the truths which it contains. Now, it is well known, that from the philosophy of the Greeks, with its numerous derivative schools, hardly one experimental discovery can be collected which has any tendency to aid or to ameliorate the condition of man, or which is entitled to rank with the acknowledged principles of genuine science."—"Wherefore, as in religion, faith is proved by its works, so in philosophy, it were to be wished, that those theories should be accounted vain, which, when tried by their fruits, are barren;—much more those, which, instead of grapes and olives, have produced only the thorns and thistles of controversy."—Nov. Org. Lib. i. Aph. lxiii.

dental accessories or concomitants. The only way, in such a case, of coming at the truth, is to repeat over the experiment again and again, leaving out all the different circumstances successively, and observing with what particular combinations of them the effect is conjoined. If there be no possibility of making this separation, and if, at the same time, we wish to obtain the same result, the only method of *insuring* success is to combine together *all* the various circumstances which were united in our former trials. It is on this principle, that I have attempted, in a former chapter of this work, to account for the superstitious observances which always accompany the practice of medicine among rude nations. These are commonly ascribed to the influence of imagination, and the low state of reason in the earlier periods of society; but the truth is, that they are the necessary and unavoidable consequences of a limited experience, and are to be corrected, not by mere force of intellect, but by a more enlarged acquaintance with the established order of nature.*

Observations perfectly similar to those which I made with respect to medicine are applicable to all the other branches of philosophy. Wherever an interesting *change* is preceded by a combination of different circumstances, it is of importance to vary our experiments in such a manner as to distinguish what is essential from what is accessory; and when we have carried the decomposition as far as we can, we are entitled to consider this simplest combination of indispensable conditions, as the *physical cause* of the event.

When by thus comparing a number of cases, agreeing in some circumstances, but differing in others, and all attended with the same result, a philosopher connects, as a general law of nature, the event with its *physical cause*, he is said to proceed according to the method of *induction*. This, at least, appears to me to be the idea which, in general, Bacon himself annexes to the phrase :† although I will not venture to affirm, that he has always employed it with uniform precision. I acknowledge, also, that it is often used by very accurate writers, to denote the whole of that system of rules, of which the process just mentioned forms the most essential and characteristical part.

The same word *induction* is employed by mathematicians in a sense not altogether different. In that general *formula* (for instance) known by the name of the Binomial Theorem, having found that it corresponds with the table of powers raised from a Binomial root, as far, as it is carried by actual multiplication, we have no scruple to conclude, that it holds universally. Such a proof of a mathematical theorem is called a proof by *induction* ;—a mode of speaking obviously suggested by the previous application of this term to our inferences concerning the laws of nature. There is, at the same time, notwithstanding the obvious analogy between the two cases, one very essential circumstance by which they are discriminated;—that in mathematical induction, we are led to our conclusion (as I shall afterwards endeavour to shew) by a process of thought, which, although not conformable to the rules of legitimate demonstration, involves, nevertheless, a logical inference of the understanding with respect to an universal truth or theorem; whereas, in drawing a general physical conclusion from particular facts, we are guided merely by our instinctive expectation of the continuance of the laws of nature; an expectation which, implying little, if any, exercise of the reasoning powers, operates alike on the philosopher and on the savage.

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* Elements of the Philosophy of the Human Mind, Vol. I. chap. v. Part ii. sect. i.

† Inductio, quae ad inventionem et demonstrationem scientiarum et artium erit utilis, naturam separare debet, per rejectiones et exclusiones debitas, &c. &c.—Nov. Org. Lib. i. Aph. cv.

[Induction, which will be useful for the finding out and demonstration of sciences and arts, ought to separate what is united, by means of proper rejections and exclusions, &c.]

To this belief in the permanent uniformity of physical laws, Dr. Reid long ago gave the name of the *inductive principle.* "It is "from the force of this principle (he observed) that we immediately "assent to that axiom upon which all our knowledge of nature "is built, That effects of the same kind must have the same cause. "For effects and causes, in the operations of nature, mean nothing "but signs, and the things signified by them. We perceive no pro-"per causality or efficiency in any natural cause; but only a con-"nexion established by the course of nature between it and what is "called its effects."[*]

A late celebrated writer, more distinguished by the singular variety and versatility of his talents than by the depth or soundness of his understanding, was pleased to consider Reid's *inductive principle* as a fit subject of ridicule; asserting that the phenomenon in question was easily explicable by the common principles of *experience*, and the *association of ideas.* "Though no man (says he) has had "any experience of what *is* future, every man has had experience "of what *was* future."[†] Of the shallowness of this solution philosophers are, I believe, now very generally convinced; but even if the case were otherwise, the *fact* remarked by Reid would be equally entitled to the attention of logicians as the basis of all physical science, nor would it be easy to distinguish it by a name less liable to objection than that which he has selected.

In all Bacon's logical rules, the authority of this law of belief is virtually recognized, although it is no where formally stated in his writings; and although the doctrines connected with it do not seem to be easily reconcilable with some of his occasional expressions. It is indeed only of late that natural philosophers have been fully aware of its importance as the ground-work of the inductive logic; the earlier writers under whose review it fell having been led to consider it chiefly by its supposed subserviency to their metaphysical or to their theological speculations. Dr. Reid and M. Turgot were, so far as I know, the first who recognized its existence as an original and ultimate law of the understanding;—the source of all that experimental knowledge which we begin to acquire from the moment of our birth, as well as of those more recondite discoveries which are dignified by the name of science. It is but justice to Mr. Hume to acknowledge, that his Treatise of Human Nature furnished to Dr. Reid all the premises from which his conclusions were drawn; and that he is therefore fairly entitled to the honour of having reduced logicians to the alternative of either acquiescing in his sceptical inferences, or of acknowledging the authority of some instinctive principles of belief, overlooked in Locke's Analysis.*

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[*] Inquiry into the Human Mind, Chap. vi. Sect. 24.

[†] Priestley's Examination of Reid, Beattie and Oswald, p. 85. Some very judicious and decisive strictures on this theory of Priestley may be found in Dr. Campbell's Philosophy of Rhetoric. See note at the end of the sixth chapter of Book i.

II. There is another circumstance which frequently adds to the difficulty of tracing the laws of nature; and which imposes on the philosopher, while carrying on the process of induction, the necessity of following a still more refined logic than has been hitherto described.—When a uniformity is observed in a number of different events, the curiosity is roused by the coincidence, and is sometimes led insensibly to a general conclusion. In a few other cases, a multiplicity of events, which appear to common observers to be altogether anomalous, are found, upon a more accurate and continued examination of them, to be subjected to a regular law.† The cycles by which the ancients predicted eclipses of the sun and moon; the two laws inferred by Kepler from the observations of Tycho Brahe; the law of refraction inferred by Snellius from the tables of Kircher and Scheiner, are instances of very comprehensive and most important rules obtained by the mere examination and comparison of particulars. Such purely *empirical discoveries*, however, are confined almost entirely to optics and astronomy, in which the physical laws combined together are comparatively few, and are insulated from the influence of those incalculable accidents which, in general, disturb the regularity of terrestrial phenomena. In by far the greater number of instances, the appearances of nature depend on a variety of different laws, all of which are often combined together in producing one single event. And, wherever such a combination happens, although each law may take place with the most complete uniformity, it is likely that nothing but confusion will strike the mere observer. A collection of such results, therefore, would not advance us one step in the knowledge of nature; nor would it enable us to anticipate the issue of one new experiment. In cases of this description, before we can avail ourselves of our past experience, we must employ our reasoning powers in comparing a variety of instances together, in order to discover by a sort of *analysis* or decomposition, the simple laws which are concerned in the phenomenon under consideration;—after which, we may proceed safely, in determining *a priori* what the result will be of any hypothetical combination of them, whether total or partial.*

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* Note (O.)

† Philosophy of the Human Mind, Vol. I. Chap. vi. Sect. iv.

These observations have led us to the same conclusion with that which forms the great outline of Bacon's plan of philosophizing; and which Newton has so successfully exemplified in his inquiries concerning gravitation and the properties of light. While they point out, too, the respective provinces and uses of the *analytic* and the *synthetic* methods, they illustrate the etymological propriety of the names by which, in the Newtonian School, they are contradistinguished from each other.

In fact, the meaning of the words *analysis* and *synthesis*, when applied to the two opposite modes of investigation in physics, is extremely analogous to their use in the practice of chemistry. The chief difference lies in this, that, in the former case, they refer to the logical processes of the understanding in the study of *physical laws*; in the latter, to the operative processes of the laboratory in the examination of material substances.

If the foregoing remarks are well founded, they lead to the correction of an oversight which occurs in the ingenious and elegant sketch of the History of Astronomy, lately published among the posthumous works of Mr. Smith; and which seems calculated to keep out of view, if not entirely to explode that essential distinction which I have been endeavouring to establish, between the inductive logic of Bacon's followers, and the hypothetical theories of their predecessors.

"Philosophy" (says Mr. Smith) "is the science of the connecting 'principles of nature. Nature, after the largest experience that 'common observation can acquire, seems to abound with events 'which appear solitary and incoherent with all that go before them; 'which therefore disturb the easy movement of the imagination; 'which make its ideas succeed each other, if one may say so, by 'irregular starts and sallies; and which thus tend, in some measure, 'to introduce a confusion and distraction and giddiness of mind. 'Philosophy, by representing the invisible chains which bind to'gether all these disjointed objects, endeavours to introduce order

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* "Itaque naturae facienda est prorsus solutio et separatio: non per ignem certe, sed per mentem tanquam ignem divinum"† Nov. Organ. Lib II Aphor. xvi. The remainder of the aphorism is equally worthy of attention; in reading which, however, as well as the rest of Bacon's philosophical works, I must request, for a reason afterwards to be mentioned, that the word *law* may be substituted for *form*, wherever it may occur.—An attention to this circumstance will be found of much use in studying the *Novum Organon*.

A similar idea, under other metaphorical disguises, often occurs in Bacon Considering the circumstances in which he wrote, logical precision was altogether impossible: yet it is astonishing with what force he conveys the *spirit* of the soundest philosophy of the eighteenth century "Neque enim in plano via sita est, sed *ascendendo* et *descendendo*; ascendendo primo ad axiomata, descendendo ad opera"‡ Nov. Org. Lib. i Aphor. ciii.

† [Therefore a solution and separation of nature is to be attempted, not certainly by fire, but by means of the understanding as a divine fire.]

‡ [Neither is the path upon a plain surface but ascends and descends. Ascends to Axioms and descends to conclusions.]

"into this chaos of jarring and discordant appearances; to allay this "tumult of the imagination; and to restore it, when it surveys the "great revolutions of the universe, to that tone of tranquillity and "composure, which is both most agreeable in itself, and most suitable to its nature. Philosophy, therefore, may be regarded as one "of those arts which address themselves to the imagination, by rendering the theatre of nature a more coherent, and, therefore, a "more magnificent spectacle, than otherwise it would have appeared to be."

That this is *one* of the objects of philosophy, and *one* of the advantages resulting from it, I very readily admit. But, surely, it is not the *leading* object of that plan of inductive investigation which was recommended by Bacon, and which has been so skilfully pursued by Newton. Of all philosophical systems, indeed, hypothetical or legitimate, it must be allowed, that, to a certain degree, they both please the imagination and assist the memory, by introducing order and arrangement among facts, which had the appearance, before, of being altogether unconnected and isolated. But it is the peculiar and exclusive prerogative of a system fairly obtained by the method of induction, that, while it enables us to arrange facts already known, it furnishes the means of ascertaining, by synthetic reasoning, those which we have no access to examine by direct observation. The difference, besides, among hypothetical theories, is merely a difference of *degree*, arising from the greater or less ingenuity of their authors; whereas legitimate theories are distinguished from all others *radically and essentially*; and, accordingly, while the former are liable to perpetual vicissitudes, the latter are as permanent as the laws which regulate the order of the universe.

Mr. Smith himself has been led by this view of the object of philosophy, into expressions concerning the Newtonian discoveries, which seem to intimate, that, although he thought them far superiour, in point of ingenuity, to any thing the world had seen before, yet, that he did not consider them as so completely exclusive of a still happier system in time to come, as the Newtonians are apt to imagine. "The system of Newton" (he observes) "now prevails "over all opposition, and has advanced to the acquisition of the "most universal empire that was ever established in philosophy. "His principles, it must be acknowledged, have a degree of firmness and solidity that we should in vain look for in any other "system. The most sceptical cannot avoid feeling this. They "not only connect together most perfectly all the phenomena of the "heavens which had been observed before his time; but those "also which the persevering industry and more perfect instruments "of later astronomers have made known to us, have been either "easily and immediately explained by the application of his principles, or have been explained in consequence of more laborious "and accurate calculations from these principles, than had been "instituted before. And *even we*, while we have been endeavour-

“ ing to represent all *philosophical systems as mere inventions of the imagination*, to connect together the otherwise disjointed and discordant phenomena of nature, have insensibly been drawn in to make use of language expressing the connecting principles of this one, as if they were the real chains which nature makes use of, to bind together her several operations.

If the view which I have given of Lord Bacon's plan of investigation be just, it will follow, That the Newtonian theory of gravitation can, in no respect whatever admit of a comparison with those systems which are, in the slightest degree, the offspring of imagination; in as much as the principle employed to explain the phenomena is not a hypothesis, but a *general fact* established by induction; for which fact we have the very same evidence as for the various particulars comprehended under it. The Newtonian theory of gravitation, therefore, and every other theory which rests on a similar basis, is as little liable to be supplanted by the labours of future ages, as the mathematical conclusions of Euclid and Archimedes. The doctrines which it involves may be delivered in different, and perhaps less exceptionable forms; but, till the order of the universe shall be regulated by new physical laws, their substance must forever remain essentially the same. On the *chains, indeed, which nature makes use of to bind together her several operations*, Newton has thrown no light whatever; nor was it the aim of his researches to do so. The subjects of his reasonings were not occult connexions, but particular phenomena, and general laws;—both of them possessing all the evidence which can belong to *facts* ascertained by observation and experiment. From the one or the other of these all his inferences, whether analytical or synthetical, are deduced: Nor is a single hypothesis involved in his *data*, excepting the authority of that Law of Belief which it tacitly and necessarily assumed in all our physical conclusions,—The stability of the order of nature.

SECTION II.

Continuation of the Subject.—The Induction of Aristotle compared with that of Bacon.

In this section I intend to offer a few slight remarks upon an assertion which has been hazarded with some confidence in various late publications, that the method of investigation, so much extolled by the admirers of Lord Bacon, was not unknown to Aristotle.—It is thus very strongly stated by the ingenious author of a memoir in the Asiatic Researches.*

“ From some of the extracts contained in this paper, it will appear, 1st, That the mode of reasoning by *induction*, illustrated and improved by the great Lord Verulam, in his *Organum Novum*, and

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* Asiatic Researches, Vol. VIII. p. 89, 90. London Edition.

" generally considered as the cause of the rapid progress of science " in later times, was *perfectly known* to Aristotle, and was distinctly " delineated by him, as a method of investigation that leads to cer" tainty or truth: and 2dly, That Aristotle was likewise *perfectly* " *acquainted*, not merely with the form of induction, but with the pro" per materials to be employed in carrying it on—facts and experi" ments. We are therefore led to conclude, that all the blame of " confining the human mind for so long a time in chains, by the " force of syllogism, cannot be fairly imputed to Aristotle; nor all " the merit of enlarging it, and setting it free, ascribed to Lord " Verulam."

The memoir from which this passage is copied, consists of extracts translated (through the medium of the Persian) from an Arabic treatise entitled the *Essence of Logic.* When it was first presented to the Asiatic Society, the author informs us, that he was altogether ignorant of the coincidence of his own conclusions with those of Dr. Gillies; and he seems to have received much satisfaction from the subsequent perusal of the proofs alleged in support of their common opinion by that learned writer. " From the perusal " of *this wonderful book* (Dr. Gillies's exposition of the ethics and " politics of Aristotle) I have now the satisfaction to discover, that the " conjectures I had been led to draw from these scanty materials, " are completely confirmed by the opinion of an author, who is pro" bably better qualified than any preceding commentator on Aris" totle's works, to decide on this subject."*

It is observed by Bailly in his History of Astronomy, that, although frequent mention is made of *attraction* in the writings of the ancients, we must not therefore " conclude that they had any pre" cise or just idea of that law into which Newton has resolved the " phenomena of the planetary revolutions. To their conceptions, " this word presented the notion of an occult *sympathy* between " different objects; and if any of them extended it from the de" scent of terrestrial bodies to explain the manner in which the " moon was retained in her orbit, it was only an exhibition upon a " larger scale of the popular errour."† The same author has remarked, on a different occasion, that, in order to judge of the philosophical ideas entertained at a particular period, it would be necessary to possess the dictionary of the age,—exhibiting the various shades of meaning derived from fashion or from tradition. " The import of words (he adds) changes with the times: their sig" nification enlarging with the progress of knowledge. Languages " are every moment perishing in detail from the variations intro" duced by custom: they grow old like those that speak them; " and like them gradually alter their features and their form."‡

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* Ibid. Vol. VIII. p 89, 90.

† Hist. de l'Astronomie Moderne, Tome II. p. 555, 556.

‡ Hist. de l'Astronomie Moderne, Tome III. p. 184.

If this observation be just, with respect to the *attraction* of the ancients, when compared with the *attraction* of Newton, it will be found to apply with still greater force to the *induction* of Aristotle,[*] considered in contrast with the *induction* of Bacon.

It is well known to those who are at all conversant with Bacon's writings, that, although he borrowed many expressions from the scholastic phraseology then in vogue, he has, in general, not only employed them in new acceptations, consonant to the general spirit of his own logic, but has, by definitions or explanations, endeavoured to guard his readers against the mistakes to which they might be exposed, from a want of attention to the innovations thus introduced in the use of consecrated terms. How far he judged wisely in adopting this plan, (which has certainly much injured his style in point of perspicuity) I do not presume to decide; I wish only to state the fact:—his motives may be judged of from his own words.

"(1) Nobis vero ex altera parte (quibus, quantum calamo valemus, "inter vetera et nova in literis foedus et commercium contrahere, "cordi est) decretum manet, antiquitatem comitari *usque ad aras*; "atque vocabula antiqua retinere, quanquam sensum eorum et "definitiones saepius immutemus; secundum moderatum illum et "laudatum, in Civilibus, novandi modum, quo rerum statu novato "verborum tamen solennia durent; quod notat Tacitus; *eadem* "*magistratuum vocabula*."[†]

Of these double significations, so common in Bacon's phraseology, a remarkable instance occurs in the use which he makes of the scholastic word *forms*. In one passage, he approves of the opinion of Plato, that the investigation of *forms* is the proper object of science; adding, however, that this is not true of the *forms* which Plato had in view, but of a different sort of *forms*, more suited to the grasp of our faculties.[‡] In another passage, he observes, that when

[*] Ἐπαγωγη. Translated *Inductio* by Cicero.

[†] De Aug. Scient. Lib. iii. Cap. iv.

The necessity under which the anti-Aristotelians found themselves, in the earlier part of the 17th century, of disguising their attack on the prevailing tenets, is strongly illustrated in a letter from Des Cartes to Regius. "Pourquoi rejettez-vous publiquement *les qualités réelles* et *les formes substantielles*, si cheres aux scholastiques: J'ai déclaré, que je ne prétendois pas les nier, mais que je n'en avois pas besoin pour expliquer mes pensées."

[Why do you publicly reject *real qualities* and *substantial forms*? so dear to the disciples of the schools. I have declared that I do not pretend to deny them, but that I have no need of them to explain my thoughts.]

[‡] Manifestum est, Platonem, virum sublimis ingenii (quique veluti ex rupe excelsa omnia circumspiciebat) in sua de ideis doctrina, *formas esse verum scientiae objectum*, vidisse; itemque sententiae hujus verissimae fructum amiserit, *formas* penitus à materia abstractas,

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(1) [But for myself, as I am desirous, as far as lies within the ability of my pen, to make a treaty of alliance and commerce between the old and new schools of philosophy and letters, I have determined to accompany antiquity even to the altar, and to retain terms of established usage, although I should often vary them in sense and definition; according to that moderate and laudable custom of innovation by Civilians, that when a new state of affairs is introduced, the accustomed terms should remain. So Tacitus, *The offices were distinguished by the same names*.]

he employs the word *forms*, in speaking of natural philosophy, he is always to be understood as meaning the *laws of nature.** Whether so accurate a reasoner as Locke would have admitted Bacon's general apology for so glaring an *abuse of words*, may perhaps be doubted: but, after comparing the two foregoing sentences, would Locke (notwithstanding his ignorance of the syllogistic art) have inferred, that Bacon's opinion of the proper object of science was the same with that of Plato? The attempt to identify Bacon's induction with the induction of Aristotle, is (as I trust will immediately appear) infinitely more extravagant. It is like confounding the Christian Graces with the Graces of Heathen Mythology.

The passages in which Bacon has been at pains to guard against the possibility of such a mistake are so numerous, that it is surprising how any person, who had ever turned over the pages of the Novum Organon, should have been so unlucky as not to have lighted upon some one of them. The two following will suffice for my present purpose.

" (1) In constituendo autem axiomate, forma inductionis alia quam
" adhuc in usu fuit, excogitanda est. Inductio enim quae procedit
" per *enumerationem simplicem* res puerilis est, et precario concludit.
" At *inductio*, quae ad inventionem et demonstrationem scientiarum
" et artium erit utilis, naturam separare debet, per rejectiones et
" exclusiones debitas; ac deinde post negativas tot quot sufficiunt,

non in materia determinatas contemplando et prensando. Quod si diligenter, serio, et sincere, ad actionem, et usum, et oculos convertamus; non difficile erit disquirere, et notitiam assequi, quae sint illae *formae*, quarum cognitio res humanas miris modis locupletare et beare possit. De Augment. Scient. Lib. iii. Cap. iv.

[It is clear, that Plato, a man of sublime genius and who saw every thing around him as from a lofty eminence, in his doctrine of images, saw that *forms are the true object of science;* though he lost the advantage of this most true opinion, by arresting and contemplating *forms* as wholly abstracted from matter, and not as existing in matter. Whereas, if we diligently, carefully, and sincerely turn to practice, and use, and the perception of our senses, it will not be difficult for us to enquire, or to learn, what are those *forms*, an acquaintance with which will so wonderfully extend the boundaries of human knowledge.]

* Nos quum de formis loquimur, nil aliud intelligimus, quam leges illas, quae naturam aliquam simplicem ordinant et constituunt; ut calorem, lumen, pondus, in omnimoda materia et subjecto susceptibili. Itaque eadem res est *forma* calidi, aut *forma* luminis, et *lex* calidi, sive *lex* luminis."—Nov. Org. Lib. ii. Aph. xvii.

[When we speak of forms, we understand nothing more, than those laws which regulate and constitute any simple disposition of nature; as heat, light, weight, in matter, and every subject susceptible of them; therefore the *form* of heat, the *form* of light, is the same as the *law* of heat, the *law* of light, &c.]

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(1) [In the formation of an Axiom, a form of induction different from that in common use must be struck out. For that induction which proceeds by simple enumeration is a childish thing and concludes unsatisfactorily. But an induction which will be useful to the discovery and demonstration of the arts and sciences, ought to separate those properties which are original, by proper rejections and exclusions; and then, after as many negatives as are sufficient, to decide upon the affirmatives. This as yet hath not been done, nor indeed attempted, except in some degree by Plato, who has indeed in some measure made use of this form of induction for the purpose of thoroughly examining definitions and ideas. But to a good and proper use of this kind of induction, very many things are necessary which no man has hitherto thought of: so that more labour must be bestowed upon it, than has been spent upon syllogism. And *in this species of induction* is our greatest hope.]

“ super affirmativas concludere; quod adhuc factum non est, nec “ tentatum certe, nisi tantummodo a Platone, qui ad excutiendas de- “ finitiones et ideas, hac certe forma inductionis aliquatenus utitur. “ Verum ad hujus inductionis, sive demonstrationis, instructionem “ bonam et legitimam, quamplurima adhibenda sunt, quae adhuc “ nullius mortalium cogitationem subiere; adeo ut in ea major sit “ consumenda opera, quam adhuc consumpta est in syllogismo. *At- “ que in hac certe inductione*, spes maxima sita est.”[*]

—— “ (1) Cogitavit et illud — Restare *inductionem*, tanquam ulti- “ mum et unicum rebus subsidium et perfugium. Verum et hujus *nomen* “ tantummodo notum esse; *vim et usum* homines hactenus latuisse.”[†]

That I may not, however, be accused of resting my judgment entirely upon evidence derived from Bacon's writings, it may be proper to consider, more particularly, to what the induction of Aristotle really amounted, and in what respects it coincided with that to which Bacon has extended the same name.

“ Our belief (says Aristotle in one passage) is, in every instance, “ founded either on syllogism or induction.” To which observation he adds, in the course of the same chapter, that “ induction is an “ inference drawn from *all* the particulars which it comprehends.”[‡] It is manifest, that, upon this occasion, Aristotle speaks of that induction which Bacon, in one of the extracts quoted above, describes as proceeding by simple enumeration; and which he, therefore, pronounces to be “ a puerile employment of the mind, and a mode “ of reasoning leading to uncertain conclusions.”

In confirmation of Bacon's remark, it is sufficient to mention, by way of illustration, a single example; which example, to prevent cavils, I shall borrow from one of the highest logical authorities,— Dr. Wallis of Oxford.

“ In an inference from induction, (says this learned writer) if the “ enumeration be complete, the evidence will be equal to that of a “ perfect syllogism; as if a person should argue, that all the planets “ (the Sun excepted) borrow their light from the Sun, by proving “ this separately of Saturn, Jupiter, Mars, Venus, Mercury, and the “ Moon. It is, in fact, a syllogism *in Darapti*, of which this is the “ form.

[*] Nov. Org. Lib. i. Aph. cv.

[†] Cogitata et Visa. The short tract to which Bacon has prefixed this title contains a summary of what he seems to have considered as the leading tenets of his philosophical works. It is one of the most highly finished of all his pieces, and is marked throughout with an impressive brevity and solemnity, which commands and concentrates the attention. Nor does it affect to disguise that consciousness of intellectual force, which might be expected from a man destined to fix a new era in the history of human reason.—*Franciscus Baconus sic cogitavit*, &c. &c.

[‡] First Analytics, Chap. xxiii. Vol. I. p. 126. Edit. Du Val.

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(1) [It hath been his opinion, that there yet remains an *induction*, our sole and last refuge. As yet, however, this is known by *name* only; its *power* and *use* have been hitherto concealed from mankind.]

"*Saturn, Jupiter, Mars, Venus, Mercury, and the Moon, each*
"*borrow their light from the Sun:*
"*But this enumeration comprehends all the Planets, the Sun*
excepted:
"*Therefore all the Planets, (the Sun excepted) borrow their*
light from the Sun."*

If the object of Wallis had been to expose the *puerility* and the *precariousness* of such an argument, he could not possibly have selected a happier illustration. The *induction* of Aristotle, when considered in *this* light, is indeed a fit companion for his syllogism; in as much, as neither can possibly advance us a single step in the acquisition of new knowledge. How different from both is the induction of Bacon, which, instead of carrying the mind round in the same circle of words, leads it from the *past* to the *future*, from the *known* to the *unknown*?†

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* Institutio Logica, Lib. iii. cap. 15. The reasoning employed by Wallis to shew that the above is a legitimate syllogism *in Darapti*, affords a specimen of the facility with which a logical conjuror can transform the same argument into the most different shapes. "Siquis objiciat, hunc non esse legitimum in *Darapti* syllogismum, eo quod conclusionem habeat universalem; dicendum erit hanc universalem (qualis qualis est) esse universalem *collectivam;* quae *singularis* est. Estque vox *omnis* hic loci (quae dici solet) pars *Categorematica;* utpote pars termini minoris (ut ex minori propositione liquet) qui hic est (non *Planetae* sed) *omnes Planetae* (*excepto sole,*) seu tota collectio reliquorum (excepto sole) Planetarum, quae *collectio* unica est; adeoque conclusio *singularis.* Quae quidem (ut singulares aliae) quamvis sit propositio *Universalis.* vi materiae; non tamen talis est ut non possit esse conclusio in tertia figura. Quippe in tertia figura quoties minor terminus, seu praedicatum minoris propositionis (adeoque subjectum conclusionis) est quid singulare, necesse est ut conclusio ea sit (vi materiae, non formae) ejusmodi universalis."‡

In justice to Dr. Wallis, it is proper to subjoin to these quotations, a short extract from the dedication prefixed to this treatise.—"Exempla retineo, quae apud logicos trita sunt; ex philosophia quam vocant Veterem et Peripateticam petita: quia logicam hic trado, et quidem Peripateticam; non naturalem philosophiam. Adeoque, de quatuor elementis; de telluris quiete in universi medio, de gravium motu deorsum, leviumque sursum; de septenario planetarum numero, aliisque; sic loquor, ut loqui solent Peripatetici."§

† "In arte judicandi (ut etiam vulgo receptum est) aut per Inductionem, aut per Syllogismum concluditur. At quatenus ad judicium, quod fit per inductionem, nihil est, quod nos detinere debeat: *uno siquidem eodemque mentis opere illud quod quaeritur, et inveni-*

‡ [If any one object that this is not a legitimate syllogism in Darapti, because it has a universal conclusion; I shall reply, that this universal, whatever it be, is a *universal collective;* which is singular. And the word *all*, here really forms part of the predicate; as part of the minor term, (as being in a minor proposition) which here is (not the planets, but) *all the planets* (the sun excepted) or the collective enumeration of all the planets, (the sun excepted) which *collection* is one, and the conclusion therefore singular. Which indeed (as other singular propositions) although it be a universal proposition on account of the matter of which it is formed; yet it is not such that it cannot be a conclusion in the third figure. For in the third figure, as often as the minor term, or the predicate of the minor proposition, (and therefore the subject of the conclusion,) is any thing singular, of necessity the conclusion (in virtue of the matter, not the form) is a universal of the same kind.]

§ [I retain as examples those which are common with logicians; drawn from the philosophy which they call the ancient or Peripatetic; because I here treat of logic and the Peripatetic art, not of natural philosophy. And so, of the four elements, of the rest of the earth in absolute space, of the motion downwards of heavy bodies, and of light bodies upwards, of the septenary number of the planets, and of other matters; I speak as the Peripatetics are wont to do.]

allis afterwards very justly remarks, "that inductions of t are of frequent use in mathematical demonstrations; in after enumerating all the possible cases, it is proved, that position in question is true of each of these considered se-y; and the general conclusion is thence drawn, that the n holds universally. Thus, if it were shewn, that, in all gled triangles, the three triangles are equal to two right and that the same thing is true in all acute-angled, and also btuse angled triangles; it would necessarily follow, that in riangle the three angles are equal to two right angles; hree cases manifestly exhausting all the possible varieties h the hypothesis is susceptible."

ief motive for introducing this last passage, was to correct which, it is not impossible, may have contributed to mislead Wallis's readers. As the professed design of the treatise m, was to expound the logic of Aristotle, agreeably to the its original author; and as all its examples and illustrations s truths the Peripatetic tenets, it was not unnatural to refer me venerated source the few incidental reflections with allis has enriched his work. Of this number is the forego-rk, which differs so very widely from Aristotle's account of tical induction, that I was anxious to bring the two opinions ediate contrast. The following is a faithful translation from 's own words:

y person were to show, by particular demonstrations, that triangle, separately considered, the equilateral, the scalene, isosceles, has its three angles equal to two right angles, ld not, *therefore*, know that the three angles of a triangle al to two right angles, except after a *sophistical* manner. ould he know this as an universal property of a triangle, h, beside these, no other triangle can be conceived to ex-: he does not know that it belongs to it *quâ* triangle: Nor belongs to every triangle, excepting in regard to number; wledge not extending to it as a property of the genus, al-it is impossible that there should be an individual which nus does not include."*

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ur—At inductionis formam vitiosam prorsus valere jubemus; legitimam ad anum remittimus."—De Aug. Scient. Lib. v. Cap. iv.
t of reasoning (at least as commonly received,) the conclusion is drawn either or by syllogism. As to the judgment which is drawn from induction, there hich need detain us, for whatever is sought is both discovered and judged of the same effort of the mind. We neglect, therefore, the form of induction nsider useless, and refer for the true to the Novum Organum.]

υτο ουδ' αν τις δειξη καθ' ἑκαστον το τριγωνον αποδειξει η μια η ἑτερα, ις εχει ἑκαστον, το ισοπλευρον χωρις, και το σκαληνον, και το ισοσκελες ο τριγωνον ὁτι δυο ορθαις ισον, ει μη τον σοφιστικον τροπον· ουδε καθολου δ' ει μηδεν εστι παρα ταυτα τριγωνον ἑτερον· ου γαρ. ᾗ τριγωνον ουδεν ργωνον, αλλ' ἡ κατ αριθμον· κατ' ειδος δε ου παν, και ει μηδεν εστιν ὁ ουκ yt. Poster. Lib. i. Cap. v.

For what reason Aristotle should have thought of applying to such an induction as this the epithet *sophistical*, it is difficult to conjecture. That it is more tedious, and therefore less elegant than a general demonstration of the same theorem, is undoubtedly true; but it is not on that account the less logical, nor, in point of form, the less rigorously geometrical. It is, indeed, precisely on the same footing with the proof of every mathematical proposition which has not yet been pushed to the utmost possible limit of generalization.

It is somewhat curious, that this hypothetical example of Aristotle is recorded as a historical fact by Proclus, in his commentary on Euclid. "One person, we are told (I quote the words of Mr. Maclaurin) discovered, that the three angles of an equilateral triangle "are equal to two right angles; another went farther, and shewed "the same thing of those that have two sides equal, and are called "isosceles triangles: and it was a third that found that the theorem "was general, and extended to triangles of all sorts. In like manner, when the science was farther advanced, and they came to "treat of the conic sections, the plane of the section was always "supposed perpendicular to the side of the cone; the parabola was "the only section that was considered in the right-angled cone, the "ellipse in the acute-angled cone, and the hyperbola in the obtuse-angled. From these three sorts of cones, the figures of the sections had their names for a considerable time; till, at length, Apollonius shewed that they might all be cut out of any one cone, and, "by this discovery, merited in those days the appellation of the "Great Geometrician."*

It would appear, therefore, that in mathematics, an inductive inference may not only be demonstratively certain, but that it is a natural, and sometimes perhaps a necessary step in the generalization of our knowledge. And yet it is of one of the most unexceptionable inductive conclusions in this science, (the only science in which it is easy to conceive an enumeration which excludes the possibility of any addition) that Aristotle has spoken,—as a conclusion resting on *sophistical* evidence.

So much with respect to Aristotle's *induction*, on the supposition that the enumeration is complete.

In cases where the enumeration is imperfect, Dr. Wallis afterwards observes, "That our conclusion can only amount to a probability or to a conjecture; and is always liable to be overturned by an *instance* to the contrary." He observes also, "That this "sort of reasoning is the principal instrument of investigation in "what is now called *experimental philosophy*; in which, by observing and examining particulars, we arrive at the knowledge of

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I have rendered the last clause according to the best of my judgment; but in case of any misapprehension on my part, I have transcribed the author's words. It may be proper to mention, that this illustration is not produced by Aristotle as an instance of *induction*; but it obviously falls under his own definition of it, and is accordingly considered in that light by Dr. Wallis.

* Account of Sir I. Newton's Phil. Discoveries, Book i, Chap. v.

"universal truths."* All this is clearly and correctly expressed; but it must not be forgotten, that it is the language of a writer trained in the schools of Bacon and of Newton.

Even, however, the induction here described by Dr. Wallis, falls greatly short of the method of philosophizing pointed out in the *Novum Organon.* It coincides exactly with those empirical inferences from mere experience, of which Bacon entertained such slender hopes for the advancement of science. "(1) Restat experientia mera; quae si occurrat, casus; si quaesita sit, experimentum nominatur. Hoc autem experientiae genus nihil aliud est, quam mera palpatio, quali homines noctu utuntur, omnia pertentando, si forte in rectam viam incidere detur; quibus multo satius et consultius foret, diem praestolari aut lumen accendere, deinceps viam inire. At contra, verus experientiae ordo primo lumen accendit, deinde per lumen iter demonstrat, incipiendo ab experientia ordinata et digesta, et minime praepostera aut erratica, atque ex ea educendo axiomata, atque ex axiomatibus constitutis rursus experimenta nova, quum nec verbum divinum in rerum massam absque ordine operatum sit."†

It is a common mistake, in the logical phraseology of the present times, to confound the words *experience* and *induction* as controvertible terms.‡ There is, indeed, between them a very close affinity; in as much as it is on experience alone that every legitimate induc-

* Institutio Logica.—See the Chapter De Inductione et Exemplo.

† Nov. Org. Aph. lxxxii.

‡ "Let it always be remembered, that the author who first taught this doctrine (*that the true art of reasoning is nothing but a language accurately defined and skilfully arranged,*) had previously endeavoured to prove, that all our notions, as well as the signs by which they are expressed, originate in perceptions of sense; and that the principles on which languages are first constructed, as well as every step in their progress to perfection, all ultimately depend *on inductions from observation; in one word, on experience merely.*"—Aristotle's Ethics and Politics by Gillies, Vol. I. pp. 94, 95.

In the latter of these pages, I observe the following sentence, which is of itself sufficient to shew what notion the Aristotelians still annex to the word under consideration. "Every kind of reasoning is carried on either by syllogism or by induction; the former proving to us, that a particular proposition is true, because it is deducible from a general one, already known to us; and the latter demonstrating a general truth, because it holds in *all* particular cases."

It is obvious, that this species of induction never can be of the slightest use in the study of nature, where the phenomena which it is our aim to classify under their general laws, are, in respect of number, if not infinite, at least incalculable and incomprehensible by our faculties.

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(1) [There remains simple experience; which if it chance to occur, is called accident; if sought for, is denominated experiment. This kind of experience is mere feeling, such as men make use of in the dark, trying every thing, if by this means they may happen to hit upon the right path. Indeed they would act more advisedly and wisely, to wait for daylight, or to light a lamp, and then to attempt the road. The true order of experience takes another method; first, it kindles a light, then by means of this light points out the path; commencing with a regular and well digested course of experiment, and not with what is absurd and erroneous; and thence deducing axioms, and from these axioms, when established, still new experiments; Even the divine Word did not operate upon chaos but in an appointed order.]

tion must be raised. The process of induction therefore presupposes that of experience; but, according to Bacon's views, the process of experience does by no means imply any idea of induction. Of this method, Bacon has repeatedly said, that it proceeds "by means of rejections and exclusions" (that is, to adopt the phraseology of the Newtonians, in the way of *analysis*) to separate or decompose nature; so as to arrive at those axioms or general laws, from which we may infer (in the way of synthesis) other particulars formerly unknown to us, and perhaps placed beyond the reach of our direct examination.*

But enough, and more than enough, has been already said to enable my readers to judge, how far the assertion is correct, that the induction of Bacon was well known to Aristotle. Whether it be yet *well known* to all his commentators, is a different question; with the discussion of which I do not think it necessary to interrupt any longer the progress of my work.

SECTION III.

Of the Import of the Words Analysis and Synthesis, in the Language of Modern Philosophy.

As the words Analysis and Synthesis are now become of constant and necessary use in all the different departments of knowledge; and as there is reason to suspect, that they are often employed without due attention to the various modifications of their import, which must be the consequence of this variety in their application,—it may be proper, before proceeding farther, to illustrate, by a few examples, their true logical meaning in those branches of science, to which I have the most frequent occasions to refer in the course of these inquiries. I begin with some remarks on their primary signification in *that* science, from which they have been transferred by the moderns to Physics, to Chemistry, and to the Philosophy of the Human Mind.

I.

Preliminary Observations on the Analysis and Synthesis of the Greek Geometricians.

It appears from a very interesting relic of an ancient writer,† that, among the Greek geometricians, two different sorts of analysis were employed as aids or guides to the inventive powers; the one adapted to the solution of problems; the other to the demonstration of theorems. Of the former of these, many beautiful exemplifications have been long in the hands of mathematical students; and of the latter, (which has drawn much less attention in modern times) a satisfactory idea may be formed from a series of propositions published at Edinburgh about fifty years ago.* I do not, however, know, that any person has yet turned his thoughts to an examination of the deep and subtle logic displayed in these analytical investigations; although it is a subject well worth the study of those who delight in tracing the steps by which the mind proceeds in pursuit of scientific discoveries. This *desideratum* it is not my present purpose to make any attempt to supply; but only to convey such general notions as may prevent my readers from falling into the common error, of confounding the analysis and synthesis of the Greek Geometry, with the analysis and synthesis of the Inductive Philosophy.

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* Nov. Org. Aph. cv. ciii.

† Preface to the seventh book of the Mathematical Collections of Pappus Alexandrinus. An extract from the Latin version of it by Dr. Halley may be found in note (P.)

In the arrangement of the following hints, I shall consider, in the first place, the nature and use of analysis in investigating the demonstration of *theorems.*—For such an application of it, various occasions must be constantly presenting themselves to every geometer;—when engaged, for example, in the search of more elegant modes of demonstrating propositions previously brought to light; or in ascertaining the truth of dubious theorems, which, from analogy, or other accidental circumstances, possess a degree of verisimilitude sufficient to rouse the curiosity.

In order to make myself intelligible to those who are acquainted only with that form of reasoning which is used by Euclid, it is necessary to remind them, that the enunciation of every mathematical proposition consists of two parts. In the first place, certain suppositions are made; and secondly, a certain consequence is affirmed to follow from these suppositions. In all the demonstrations which are to be found in Euclid's Elements (with the exception of the small number of indirect demonstrations,) the particulars involved in the hypothetical part of the enunciation are assumed as the principles of our reasoning; and from these principles, a series or chain of consequences is, link by link, deduced, till we at last arrive at the conclusion which the enunciation of the proposition asserted as a truth. A demonstration of this kind is called a Synthetical demonstration.

Suppose now, that I arrange the steps of my reasoning in the reverse order; that I assume hypothetically the truth of the proposition which I wish to demonstrate, and proceed to deduce from this assumption, as a principle, the different consequences to which it leads. If, in this deduction, I arrive at a consequence which I already know to be true, I conclude with confidence that the principle from which it was deduced is likewise true. But if, on the other hand, I arrive at a consequence which I know to be false, I conclude, that the principle or assumption on which my reasoning has proceeded is false also.—Such a demonstration of the truth or falsity of a proposition is called an Analytical demonstration.

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* Propositiones Geometricae More Veterum Demonstratae. Auctore Matthaeo Stewart, S. T. P. Matheseos in Academia Edinensi Professore, 1763.

According to these definitions of Analysis and Synthesis, those demonstrations in Euclid which prove a proposition to be true, by shewing, that the contrary supposition leads to some absurd inference, are, properly speaking, analytical processes of reasoning.—In *every* case, the conclusiveness of an analytical proof rests on this general maxim, That *truth* is always consistent with itself; that a supposition which leads, by a concatenation of mathematical deductions, to a consequence which is true, must itself be true; and that which necessarily involves a consequence which is absurd or impossible, must itself be false.

It is evident, that, when we are demonstrating a proposition with a view to convince another of its truth, the synthetic form of reasoning is the more natural and pleasing of the two; as it leads the understanding directly from known truths to such as are unknown. When a proposition, however, is doubtful, and we wish to satisfy our own minds with respect to it; or when we wish to discover a new method of demonstrating a theorem previously ascertained to be true; it will be found (as I already hinted) far more convenient to conduct the investigation analytically. The justness of this remark is universally acknowledged by all who have ever exercised their ingenuity in mathematical inquiries; and must be obvious to every one who has the curiosity to make the experiment. It is not, however, so easy to point out the principle on which this remarkable difference between these two opposite intellectual processes depends. The suggestions which I am now to offer appear to myself to touch upon the most essential circumstance; but I am perfectly aware that they by no means amount to a complete solution of the difficulty.

Let it be supposed, then, either that a new demonstration is required of an old theorem; or, that a new and doubtful theorem is proposed as a subject of examination. In what manner shall I set to work, in order to discover the necessary media of proof?—From the hypothetical part of the enunciation, it is probable, that a great variety of different consequences may be immediately deducible; from each of which consequences, a series of other consequences will follow: At the same time, it is possible, that only one or two of these trains of reasoning may lead the way to the truth which I wish to demonstrate. By what rule am I to be guided in selecting the line of deduction which I am here to pursue? The only expedient which seems to present itself, is merely tentative or experimental; to assume successively all the different *proximate consequences* as the *first link* of the chain, and to follow out the deduction from each of them, till I, at last, find myself conducted to the truth which I am anxious to reach. According to this supposition, I merely grope my way in the dark, without rule or method: the object I am in quest of, may, after all my labour, elude my search; and even, if I should be so fortunate as to attain it, my success affords me no lights whatever to guide me in future on a similar occasion.

Suppose now that I reverse this order, and prosecute the investigation analytically; assuming (agreeably to the explanation already given) the proposition to be true, and attempting, from this supposition, to deduce some acknowledged truth as a necessary consequence. I have here one fixed point from which I am to set out; or, in other words, one specific *principle* or *datum* from which all my consequences are to be deduced; while it is perfectly immaterial in what particular conclusion my deduction terminates, provided this conclusion be previously known to be true. Instead, therefore, of being limited, as before, to *one conclusion exclusively*, and left in a state of uncertainty where to *begin* the investigation, I have one single supposition marked out to me, from which my departure must necessarily be taken; while, at the same time, the path which I follow, may terminate with equal advantage in a variety of different conclusions. In the former case, the procedure of the understanding bears some analogy to that of a foreign spy, landed in a remote corner of this island, and left to explore, by his own sagacity, the road to London. In the latter case, it may be compared to that of an inhabitant of the metropolis, who wished to effect an escape, by *any one* of our sea-ports, to the continent. It is scarcely necessary to add, that as this fugitive,—should he happen, after reaching the coast, to alter his intentions,—would easily retrace the way to his own home; so the geometer, when he has once obtained a conclusion in manifest harmony with the known principles of his science, has only to return upon his own steps, (*cæca regens filo vestigia*) in order to convert his analysis into a direct synthetical proof.

A palpable and familiar illustration (at least in some of the most essential points) of the relation in which the two methods now described stand to each other, is presented to us by the operation of unloosing a difficult knot, in order to ascertain the exact process by which it was formed. The illustration appears to me to be the more apposite, that I have no doubt it was this very analogy, which suggested to the Greek geometers the metaphorical expressions of *analysis* and of *solution*, which they have transmitted to the philosophical language of modern times.

Suppose *a knot*, of a very artificial construction, to be put into my hands as an exercise for my ingenuity, and that I was required to investigate a rule, which others, as well as myself, might be able to follow in practice, for making knots of the same sort. If I were to proceed in this attempt according to the spirit of a geometrical *synthesis* I should have to try, one after another all the various experiments which my fancy could devise, till I had, at last, hit upon the particular knot I was anxious to tie. Such a process, however, would evidently be so completely tentative, and its final success would, after all, be so extremely doubtful, that common sense could not fail to suggest immediately the idea of tracing *the knot* through all the various complications of its progress, by cautiously *undoing* or *unknitting* each successive turn of the thread in a retrograde order, from the *last* to the *first*. After gaining this *first* step, were all the former complications restored again, by an inverse repetition of the same operations which I had performed in *undoing* them, an infallible rule would be obtained for solving the problem originally proposed; and, at the same time, some address or dexterity, in the practice of the *general method*, probably gained, which would encourage me to undertake, upon future occasions, still more arduous tasks of a similar description. The parallel between this obvious suggestion of reason, and the refined logic of the Greek *analysis*, undoubtedly fails in several particulars; but both proceed so much on the same cardinal principle, as to account sufficiently for a transference of the same expressions from the one to the other. That this transference has actually taken place in the instance now under consideration, the literal and primitive import of the words ανα and λυσις, affords as strong presumptive evidence as can well be expected in any etymological speculation.

In applying the method of analysis to geometrical problems, the investigation begins by supposing the problem to be solved; after which, a chain of consequences is deduced from this supposition, terminating at last in a conclusion, which either resolves into another problem, previously known to be within the reach of our resources; or which involves an operation known to be impracticable. In the former case, all that remains to be done, is to refer to the construction of the problem in which the analysis terminates; and then, by reversing our steps, to demonstrate synthetically, that this construction fulfils all the conditions of the problem in question. If it should appear, in the course of the composition, that in certain cases the problem is possible, and in others not, the specification of these different cases, (called by the Greek geometers the διορισμος or *determination*) becomes an indispensable requisite towards a complete solution.

The utility of the ancient analysis, in facilitating the solution of problems, is still more manifest than in facilitating the demonstration of theorems; and, in all probability, was perceived by mathematicians at an earlier period. The steps by which it proceeds in quest of the thing sought, are faithfully copied (as might be easily shewn) from that natural logic which a sagacious mind would employ in similar circumstances; and are, in fact, but a scientific application of certain rules of method, collected from the successful investigations of men who were guided merely by the light of common sense. The same observation may be applied to the analytical processes of the algebraical art.

In order to increase as far as the state of mathematical science then permitted, the powers of their analysis, the ancients, as appears from Pappus, wrote thirty-three different treatises (known among mathematicians by the name of τοπος αναλυομενος) of which number there are twenty-four books, whereof Pappus has particularly described the subjects and the contents. In what manner *some* of these were instrumental in accomplishing their purpose, has been fully explained by different modern writers; particularly by the late very learned Dr. Simson of Glasgow. Of Euclid's *Data*, (for example) the first in order of those enumerated by Pappus, he observes, that "it is of the most general and necessary use in the solution of "problems of every kind; and that whoever tries to investigate "the solutions of problems geometrically, will soon find this to be "true; for the analysis of a problem requires, that consequences be "drawn from the things that are *given*, until the thing that is sought "be shewn to be *given* also. Now, supposing that the *Data* were "not extant, these consequences must, in every particular instance, "be found out and demonstrated from the things given in the enunciation of the problem; whereas the possession of this elementary "book supersedes the necessity of any thing more than a reference "to the propositions which it contains."*

With respect to some of the other books mentioned by Pappus, it is remarked by Dr. Simson's biographer, that "they relate to general "problems of frequent recurrence in geometrical investigations: "and that their use was for the more immediate resolution of any "proposed geometrical problem, which could be easily reduced to "a particular case of any one of them. By such a reduction, the "problem was considered as fully resolved; because it was then "necessary only to apply the analysis, composition, and determination of that case of the general problem, to this particular problem "which it was shewn to comprehend."†

From these quotations it manifestly appears, that the greater part of what was formerly said of the utility of analysis in investigating the demonstration of theorems, is applicable, *mutatis mutandis*, to its employment in the solution of problems. It appears farther, that one great aim of the subsidiary books, comprehended under the title of τοπος αναλυομενος, was to multiply the number of such conclusions as might secure to the geometer a legitimate synthetical demonstration, by returning backwards, step by step, from a known or elementary construction. The obvious effect of this was, at once to abridge the analytical process, and to enlarge its resources;—on a principle somewhat analogous to the increased facilities which a fugitive from Great Britain would gain, in consequence of the multiplication of our sea-ports.

Notwithstanding, however, the immense aids afforded to the geometer by the ancient analysis, it must not be imagined that it altogether supersedes the necessity of ingenuity and invention. It diminishes, indeed, to a wonderful degree, the number of his tentative experiments, and of the paths by which he might go astray;‡ but (not to mention the *prospective* address which it supposes, in preparing the way for the subsequent investigation, by a suitable *construction* of the diagram,) it leaves much to be supplied, at every step, by sagacity and practical skill; nor does the knowledge of it, till disciplined and perfected by long habit, fall under the description of that δυναμις αναλυτικη, which is justly represented by an old Greek writer,* as an acquisition of greater value than the most extensive acquaintance with particular mathematical truths.

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* Letter from Dr. Simson to George Lewis Scott, Esq. published by Dr. Traill. See his Account of Dr. Simson's Life and Writings, p. 118.

† Ibid pp. 159, 160

‡ "Nihil a verâ et genuinâ analysi magis distat, nihil magis abhorret, quam tentandi methodus; hanc enim amovere et certissimâ viâ ad quaesitum perducere, praecipuus est analyseos finis."§

Extract from a MS. of Dr. Simson, published by Dr. Traill. See his account, &c. p. 127.

§ [Nothing is more unlike the true and genuine Analysis, than the method of *tentation*; for to set this aside, and to point by a sure and direct path to what is sought, is the chief object of Analysis.]

According to the opinion of a modern geometer and philosopher of the first eminence, the genius thus diplayed in conducting the *approaches* to a preconceived mathematical conclusion, is of a far higher order than that which is evinced by the discovery of new theorems. (1)" Longe sublimioris ingenii est (says Galileo) alieni Problematis enodatio, aut ostensio Theorematis, quam novi cujuspiam " inventio: haec quippe fortunæ in incertum vagantibus obviae " plerumque esse solent; tota vero illa, quanta est, studiosissimam " attentæ mentis, in unum aliquem scopum collimantis, rationem exposcit."† Of the justness of this observation, on the whole, I have no doubt; and have only to add to it, by way of comment, that it is chiefly while engaged in the steady pursuit of a particular object, that those discoveries which are commonly considered as entirely accidental, are most likely to present themselves to the geometer. It is the methodical inquirer alone, who is entitled to expect such fortunate occurrences as Galileo speaks of; and wherever invention appears as a characteristical quality of the mind, we may be assured, that something more than chance has contributed to its success. On this occasion, the fine and deep reflection of Fontenelle will be found to apply with peculiar force: (2)" *Ces hasards ne sont que pour ceux qui jouent bien.*"

II.

Critical Remarks on the vague Use, among Modern Writers, of the Terms Analysis and Synthesis.

THE foregoing observations on the *Analysis* and *Synthesis* of the Greek geometers may, at first sight, appear somewhat out of place,

* See the preface of Marinus to Euclid's Data. In the Preface to the 7th book of Pappus, the same idea is expressed by the phrase δυναμις ἑυρετικη.

† Not having the works of Galileo at hand, I quote this passage on the authority of Guido Grandi, who has introduced it in the preface to his demonstration of Huyghens's Theorems concerning the Logarithmic Line.—Vid. Hugenii Opera Reliqua, Tom. I. p. 43.

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(1) [The solution of a Problem or the demonstration of a Theorem which is offered by some one else, is a much greater proof of superior genius, than any new invention: for these instances of good fortune often present themselves to a mind ranging about without any certain plan; whereas the former, whatever it may be, exhibits the utmost energy of a vigorous understanding sharpening itself to one steady aim.]

(2) [These chances occur to those only who are good players.]

in a disquisition concerning the principles and rules of the Inductive Logic. As it was, however, from the Mathematical sciences, that these words were confessedly borrowed by the experimental inquirers of the Newtonian School, an attempt to illustrate their original technical import seemed to form a necessary introduction to the strictures, which I am about to offer, on the loose and inconsistent applications of them, so frequent in the logical phraseology of the present times.

Sir Isaac Newton himself has, in one of his Queries, fairly brought into comparison the Mathematical and the Physical *Analysis*, as if the word, in both cases, conveyed the same idea. "*As in Mathematics,* "*so in Natural Philosophy, the investigation of difficult things by the* "*method of Analysis ought ever to precede the method of Composition.* "This analysis consists in making experiments and observations, and "in drawing conclusions from them by induction, and admitting of "no objections against the conclusions, but such as are taken from "experiments, or other certain truths. For hypotheses are not to "be regarded in experimental philosophy. And although the argu-"ing from experiments and observations by induction be no demon-"stration of general conclusions; yet it is the best way of arguing "which the nature of things admits of, and may be looked upon as "so much the stronger, by how much the induction is more general. "And if no exception occur from phenomena, the conclusion may be "pronounced generally. But if, at any time afterwards, any excep-"tion shall occur from experiments; it may then begin to be pro-"nounced, with such exceptions as occur. By this way of analysis "we may proceed from compounds to ingredients; and from mo-"tions to the forces producing them; and, in general, from effects "to their causes; and from particular causes to more general ones, "till the argument end in the most general. This is the method of "analysis. And the synthesis consists in assuming the causes disco-"vered, and established as principles, and by them explaining the "phenomena proceeding from them, and proving the explana-"tions."*

It is to the first sentence of this extract (which has been repeated over and over by subsequent writers) that I would more particularly request the attention of my readers. Mr. Maclaurin, one of the most illustrious of Newton's followers, has not only sanctioned it by transcribing it in the words of the author, but has endeavoured to illustrate and enforce the observation which it contains. "It is evi-"dent, that as in Mathematics, so in Natural Philosophy, the inves-"tigation of difficult things by the method of analysis ought ever to "precede the method of composition, or the synthesis. For, in "any other way, we can never be sure that we assume the princi-"ples which really obtain in nature; and that our system, after we "have composed it with great labour, is not mere dream or illu-

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* See the concluding paragraphs of Newton's Optics.

"sion."* The very reason here stated by Mr. Maclaurin, one should have thought, might have convinced him, that the parallel between the two kinds of analysis was not strictly correct; in as much as this reason ought, according to the logical interpretation of his words, to be applicable to the one science as well as to the other, instead of exclusively applying (as is obviously the case) to inquiries in Natural Philosophy.

After the explanation which has been already given of geometrical and also of physical analysis, it is almost superfluous to remark, that there is little, if any thing, in which they resemble each other, excepting this,—that both of them are methods of investigation and discovery; and that both happen to be called by the same name. This name is, indeed, from its literal or etymological import, very happily significant of the notions conveyed by it in both instances; but, notwithstanding this accidental coincidence, the wide and essential difference between the subjects to which the two kinds of analysis are applied, must render it extremely evident, that the analogy of the rules which are adapted to the one can be of no use in illustrating those which are suited to the other.

Nor is this all: The meaning conveyed by the word Analysis, in Physics, in Chemistry, and in the Philosophy of the Human Mind, is radically different from that which was annexed to it by the Greek geometers, or which ever has been annexed to it by any class of modern mathematicians. In all the former sciences, it naturally suggests the idea of a decomposition of what is complex into its constituent elements. It is defined by Johnson, "a separation of a compounded body into the several parts of which it consists."—He afterwards mentions, as another signification of the same word, "a solution of any thing, whether corporeal or mental, to its first elements; as of a sentence to the single words; of a compound word, to the particles and words which form it; of a tune, to single notes; of an argument, to single propositions." In the following sentence, quoted by the same author from Glanville, the word Analysis seems to be used in a sense precisely coincident with what I have said of its import, when applied to the Baconian method of investigation. "We cannot know any thing of nature, but by an analysis of its true initial causes."†

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† By *the true initial causes of a phenomenon*, Glanville means, (as might be easily shewn by a comparison with other parts of his works) *the simple laws from the combination of which it results*, and from a previous knowledge of which, it might have been synthetically deduced, as a consequence.

That Bacon, when he speaks of those *separations of nature, by means of comparisons, exclusions, and rejections*, which form essential steps in the inductive process, had a view to the analytical operations of the chemical laboratory, appears sufficiently from the following words, before quoted. "Itaque naturae facienda est prorsus solutio et separatio; non per ignem certe, sed per mentem, tanquam ignem divinum."

In the Greek geometry, on the other hand, the same word evidently had its chief reference to the *retrograde* direction of this method, when compared with the natural order of *didactic demonstration.* Την τοιαυτην εφοδον (says Pappus) αναλυσιν καλουμεν, ὁιον αναπαλιν λυσιν; a passage which Halley thus translates; *hæc processus Analysis vocatur, quasi dicas, inversa solutio.*[*] That this is the primitive and genuine import of the preposition ανα, is very generally admitted by grammarians; and it accords, in the present instance, so happily with the sense of the context, as to throw a new and strong light on the justness of their opinion.[†]

In farther proof of what I have here stated with respect to the double meaning of the words *analysis* and *synthesis*, as employed in physics and in mathematics, it may not be superfluous to add the following considerations. In mathematical analysis, we always set out from a hypothetical assumption, and our object is to arrive at some known truth, or some *datum*, by reasoning synthetically from which we may afterwards return, on our own footsteps, to the point where our investigation began. In all such cases, the synthesis is infallibly obtained by reversing the analytical process; and as both of them have in view the demonstration of the same theorem, or the solution of the same problem, they form, in reality, but different parts of one and the same investigation. But in natural philosophy, a synthesis which merely reversed the analysis would be absurd. On the contrary, our analysis necessarily sets out from *known facts;* and after it has conducted us to a general principle, the synthetical reasoning which follows, consists always of an application of this principle to phenomena, *different* from those comprehended in the original induction.

In some cases, the natural philosopher uses the word Analysis, where it is probable that a Greek geometer would have used the word Synthesis. Thus, in astronomy, when we attempt from the known phenomena to establish the truth of the Copernican system, we are said to proceed analytically. But the analogy of ancient geometry would apply this word to a process directly the reverse; a process which, assuming the system as true, should reason from it to the known phenomena: After which, if the process could be so reversed as to prove that this system, and this system alone, is consistent with these facts, it would bear some analogy to a geometrical synthesis.

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[*] [This process is termed Analysis; as if we should say, an inverse solution.]

[†] The force of this preposition, in its primitive sense, may perhaps, without any false refinement, be traced more or less palpably, in every instance to which the word analysis is with any propriety applied. In what Johnson calls (for example,) "the separation of a compound body into the several parts of which it consists,"—we proceed on the supposition, that these parts have *previously* been combined, or put together, so as to make up the *aggregate whole*, submitted to the examination of the chemist; and consequently, that the analytic process follows an inverted or retrograde direction, in respect of that in which the compound is conceived to have been originally formed.—A similar remark will be found to apply (*mutatis mutandis*) to other cases, however apparently different.

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In some cases, the natural philosopher uses the word Analysis, where it is probable that a Greek geometer would have used the word Synthesis. Thus, in astronomy, when we attempt from the known phenomena to establish the truth of the Copernican system, we are said to proceed analytically. But the analogy of ancient geometry would apply this word to a process directly the reverse; a process which, assuming the system as true, should reason from it to the known phenomena: After which, if the process could be so reversed as to prove that this system, and this system alone, is consistent with these facts, it would bear some analogy to a geometrical synthesis.

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[†] The force of this preposition, in its primitive sense, may perhaps, without any false refinement, be traced more or less palpably, in every instance to which the word analysis is with any propriety applied. In what Johnson calls (for example,) "the separation of a compound body into the several parts of which it consists,"—we proceed on the supposition, that these parts have *previously* been combined, or put together, so as to make up the *aggregate whole*, submitted to the examination of the chemist; and consequently, that the analytic process follows an inverted or retrograde direction, in respect of that in which the compound is conceived to have been originally formed.—A similar remark will be found to apply (*mutatis mutandis*) to other cases, however apparently different.

These observations had occurred to me, long before I had remarked, that the celebrated Dr. Hooke (guided also by what he conceived to be the analogy of the Greek geometry) uses the words analysis and synthesis in physics, precisely in the contrary acceptations to those assigned to them in the definitions of Sir Isaac Newton. "The methods (he observes) of attaining a knowledge of nature may be two; either the analytic or the synthetic. The first is the proceeding from the causes to the effects. The second, from the effects to the causes. The former is the more difficult, and supposes the thing to be already done and known, which is the thing sought and to be found out. This begins from the highest, most general and universal principles or causes of things, and branches itself out into the more particular and subordinate. The second is the more proper for experimental inquiry, which from a true information of the effect by a due process, finds out the immediate cause thereof, and so proceeds gradually to higher, and more remote causes and powers effective, founding its steps upon the lowest and more immediate conclusions."*

That Hooke was led into this mode of speaking by the phraseology of the ancient mathematicians, may, I think, be safely inferred from the following very sagacious and fortunate *conjecture* with respect to the nature of their analytical investigations, which occurs in a different part of the same volume. I do not know, that any thing approaching to it is to be found in the works of any other English author prior to Dr. Halley.

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* Hooke's Posthumous Works, p. 330.

As this volume is now become extremely rare, I shall transcribe the paragraph which immediately follows the above quotation.

"An inquisition by the former (or analytic) method, is resembled fitly enough by the example of an architect, who hath a full comprehension of what he designs to do, and acts accordingly: But the latter (or synthetic) is more properly resembled to that of a husbandman or gardener, who prepares his ground, and sows his seed, and diligently cherishes the growing vegetable, supplying it continually with fitting moisture, food, and shelter,—observing and cherishing its continual progression, till it comes to its perfect ripeness and maturity, and yields him the fruit of his labour. Nor is it to be expected, that, a production of such perfection as this is designed, should be brought to its complete ripeness in an instant; but as all the works of nature, if it be naturally proceeded with, it must have its due time to acquire its due form and full maturity, by gradual growth and a natural progression; not but that the other method is also of excellent and necessary use, and will very often facilitate and hasten the progress. An instance of which kind I designed, some years since, to have given this honourable society, in some of my lectures upon the motions and influences of the celestial bodies, if it had been then fit; but I understand, the same thing will now be shortly done by Mr. Newton, in a Treatise of his now in the press: But that will not be the only instance of that kind which I design to produce, for that I have divers instances of the like nature, wherein, from a hypothesis being supposed, on a premeditated design, all the phenomena of the subject will be *a priori* foretold, and the effects naturally follow, as proceeding from a cause so and so qualified and limited. *And in truth, the* synthetic *way, by experiments and observations, will be very slow, if it be not often assisted by the* analytic, *which proves of excellent use, even though it proceed by a false position; for that the discovery of a negative is one way of restraining and limiting an affirmative.*"

Change the places of the words *analytic* and *synthetic* in this last sentence; and the remark coincides exactly with what Boscovich, Hartley, Le Sage, and many other authors, have advanced in favour of synthetical explanations from hypothetical theories. I shall have occasion afterwards to offer some additional suggestions in support of their opinion, and to point out the limitations which it seems to require.

"What ways the ancients had for finding out these mediums, or means of performing the thing required, we are much in the dark; nor do any of them shew the way, or so much as relate that they had such a one: Yet 'tis believed, they were not ignorant of some kind of algebra, by which they had a certain way to help themselves in their inquiries, though that we now use be much confined and limited to a few media. But I do rather conceive, that they had another kind of analytics, which *went backwards* through almost all the same steps by which their demonstrations *went forwards*, though of this we have no certain account, their writings being altogether silent on that particular. However, that such a way is practicable, I may hereafter, upon some other occasion, shew by some examples; whereby it will plainly appear, how much more useful it is for the finding out the ways for the solution of problems, than that which is now generally know and practised by *species*."*

The foregoing remarks, although rather of a critical than of a philosophical nature, may, I hope, be of some use in giving a little more precision to our notions on this important subject. They are introduced here, not with the most distant view to any alteration in our established language (which, in the present instance, appears to me to be not only unexceptionable, but very happily significant of its true logical import,) but merely to illustrate the occasional influence of words over the most powerful understandings; and the vagueness of the reasonings into which they may insensibly be betrayed, by a careless employment of indefinite and ambiguous terms.

If the task were not ungrateful, it would be easy to produce numerous examples of this from writers of the highest and most deserved reputation in the present times. I must not, however, pass over in silence the name of Condillac, who has certainly contributed, more than any other individual, to the prevalence of the logical errours now under consideration. "I know well (says he, on one occasion) that it is customary to distinguish different kinds of analysis; the logical analysis, the metaphysical, and the mathematical; but there is, in fact, only *one* analysis; and it is the same in all the sciences."† On another occasion, after quoting from the logic of Port Royal a passage in which it is said, "That analysis and synthesis differ from each other only, as the road we follow in ascending from the valley to the mountain, differs from the road by which we descend from the mountain into the valley,"—Condillac proceeds thus: "From this comparison, all I learn is, That the two

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* Hooke's Post. Works, p. 68.

Of the illustrations here promised by Hooke of the utility of the analytical method in geometrical investigations, no traces, as far as I have observed, occur in his writings. And it would appear from the following note by the editor, on the passage last quoted, that nothing important on the subject had been discovered among his papers.

"I do not any *where* find, that this was ever done by Dr. Hooke, and leave the usefulness therefore to be considered by the learned."

† *La Logique*, Seconde Partie, Chap. vii.

"methods are contrary to one another, and consequently, that if the "one be good, the other must be bad. In truth, we cannot proceed "otherwise than from the known to the unknown. Now, if the "thing unknown be upon the mountain, it will never be found by "descending into the valley; and if it be in the valley, it will not "be found by ascending the mountain. There cannot, therefore, "be two contrary roads by which it is to be reached. Such opinions "(Condillac adds) do not deserve a more serious criticism."*

To this very extraordinary argument, it is unnecessary to offer any reply, after the observations already made on the analysis and synthesis of the Greek geometers. In the application of these two opposite methods to their respective functions, the theoretical reasoning of Condillac is contradicted by the universal experience of mathematicians, both ancient and modern; and is, indeed, so palpably absurd, as to carry along with it its own refutation, to the conviction of every person capable of comprehending the terms of the question.—Nor would it be found more conclusive or more intelligible, if applied to the analysis and synthesis of natural philosophers; or indeed to these words, in any of the various acceptations in which they have ever hitherto been understood. As it is affirmed, however, by Condillac, that "there neither is, nor can be, more than "*one* analysis," a refutation of his reasoning, drawn from any particular science, is, upon his own principle, not less conclusive, than if founded on a detailed examination of the whole circle of human knowledge. I shall content myself, therefore, on the present occasion, with a reference to the mathematical illustrations contained in the former part of this section.

With regard to the notion annexed to this word by Condillac himself, I am not certain, if, after all that he has written in explanation of it, I have perfectly seized his meaning. "To analyze, (he tells "us, in the beginning of his Logic) is nothing more than to observe "in *a successive order* the qualities of an object, with a view of giv"ing them in the mind that *simultaneous order* in which they co"exist."† In illustration of this definition, he proceeds to remark, That "although with a single glance of the eye, a person may "discover a multitude of objects in an open champaign which he "has previously surveyed with attention, yet that the prospect is "never more distinct, than when it is circumscribed within narrow "bounds, and only a small number of objects is taken in at once. "We always discern with accuracy but a part of what we see."

"The case (he continues) is similar with the intellectual eye. I "have, at the same moment, present to it, a great number of the "familiar objects of my knowledge. I see the whole group, but am "unable to mark the discriminating qualities of individuals. To "comprehend with distinctness all that offers itself simultaneously "to my view, it is necessary that I should, in the first place, de"compose the mass;—in a manner analogous to that in which a cu-

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* Ibid. Chap. vi.

† La Logique, Première Partie, Chap. ii.

"rious observer would proceed, in decomposing, by successive steps, "the co-existent parts of a landscape.—It is necessary for me, in "other words, to *analyze my* thoughts."*

The same author afterwards endeavours still farther to unfold his notion of analysis, by comparing it to the natural procedure of the mind in the examination of a machine. "If I wish (says he) to understand a machine, I decompose it, in order to study separately "each of its parts. As soon as I have an exact idea of them all, and "am in a condition to replace them as they were formerly, I have a "perfect conception of the machine, having both decomposed and "recomposed it."†

In all this, I must confess, there seems to me to be much both of vagueness and of confusion. In the two first quotations, the word analysis is employed to denote nothing more than that separation into parts, which is necessary to bring a very extensive or a very complicated subject within the grasp of our faculties; a description, certainly, which conveys but a very partial and imperfect conception of *that* analysis which is represented as the great organ of invention in all the sciences and arts.‡ In the example of the machine, Condillac's language is somewhat more precise and unequivocal; but, when examined with attention, will be found to present an illustration equally foreign to his purpose. This is the more surprising, as the instance here appealed to might have been expected to suggest a juster idea of the method in question, than that which resolves into a literal *de*-composition and *re*-composition of the thing to be analyzed. That a man may be able to execute *both* of these manual operations on a machine, without acquiring any clear comprehension of the manner in which it performs its work, must appear manifest on the slightest reflection; nor is it less indisputable, that another person, without disengaging a single wheel, may gain, by a process purely intellectual, a complete knowledge of the whole contrivance. Indeed, I apprehend, that it is in this way alone that the theory of any complicated machine *can* be studied; for it is not the parts, separately considered, but the due combination of these parts, which constitutes the mechanism.§ An observer, accordingly, of common sagacity, is here guided by the logic of nature, to a species of analysis, bearing as much resemblance to those of mathematicians and of natural philosophers, as the very different nature of the cases admits of. Instead of allowing his eye to wander at large over the perplexing mazes of such a labyrinth, he begins by remarking the ultimate *effect*: and thence proceeds to trace backwards, step by step, the series of intermediate movements by which it is connected with the *vis motrix*. In doing so, there is undoubtedly a sort of *mental* decomposition of the machine, in as much as all its parts are successively considered in detail; but it is not this decomposition which constitutes the *analysis*. It is the methodical *retrogradation* from the mechanical effect to the mechanical power.[*]

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* La Logique, Première Partie, Chap. ii. In this last paragraph, I have introduced one or two additional clauses, which seemed to me necessary for conveying clearly the author's idea. Those who take the trouble to compare it with the original, will be satisfied, that in venturing on these slight interpolations, I had no wish to misrepresent his opinion.

† Ibid. Chap. iii.

‡ Ce qu'on nomme *methode d'invention*, n'est autre chose que l'analyse. C'est elle qui a fait toutes les découvertes; c'est par elle que nous retrouverons tout ce qui a été trouvé. Ibid.

[What we call the *Method of Invention*, is nothing else but Analysis. It is this which has effected all discoveries; it is by this that we shall again find out what has been heretofore known.]

§ If, on any occasion, a literal decomposition of a machine should be found necessary, it can only be to obtain a view of some of its parts, which, in their combined state, are concealed from observation.

The passages in Condillac to which these criticisms refer, are all selected from his Treatise on Logic, written purposely to establish his favourite doctrine with respect to the influence of language upon thought. The paradoxical conclusions into which he himself has been led by an unwarrantable use of the words Analysis and Synthesis, is one of the most remarkable instances which the history of modern literature furnishes of the truth of his general principle.

Nor does this observation apply merely to the productions of his more advanced years. In early life, he distinguished himself by an ingenious work, in which he professed to trace *analytically* the history of our sensations and perceptions; and yet, it has been very justly remarked of late, that all the reasonings contained in it are purely *synthetical*. A very eminent mathematician of the present times has even gone so far as to mention it "as a model of *geometrical* synthesis"[†] He would, I apprehend, have expressed his idea more correctly, if, instead of the epithet *geometrical*, he had employed, on this occasion, *logical* or *metaphysical*; in both of which sciences, as was formerly observed, the analytical and synthetical methods bear a much closer analogy to the experimental inductions of chemistry and of physics, than to the abstract and hypothetical investigations of the geometer.

The abuses of language which have been now under our review, will appear the less wonderful, when it is considered that mathematicians themselves do not always speak of analysis and synthesis with their characteristical precision of expression; the former word being frequently employed to denote *the modern calculus*, and the latter, *the pure geometry of the ancients*. This phraseology, although it has been repeatedly censured by foreign writers, whose opinions might have been expected to have some weight, still continues to prevail very generally upon the continent. The learned and judicious author of the History of Mathematics complained of it more than fifty years ago; remarking the impropriety "of calling by the name of the *synthetic method*, that which employs no "algebraical *calculus*, and which addresses itself to the mind and to "the eyes, by means of diagrams, and of reasonings expressed at full "length in ordinary language. It would be more exact (he observes "farther) to call it *the method of the ancients*, which, (as is now "universally known,) virtually supposes, in all its synthetical de"monstrations, the previous use of analysis. As to the algebraical "calculus, it is only an abridged manner of expressing a process of "mathematical reasoning;—which process may, according to cir"cumstances, be either analytical or synthetical. Of the latter, an "elementary example occurs in the algebraical demonstrations "given by some editors of Euclid, of the propositions in his second "Book."*

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[*] That this circumstance of *retrogradation* or *inversion* figured more than any other in the imagination of Pappus, as the characteristical feature of geometrical analysis, appears indisputably from a clause already quoted from the preface to his 7th Book;—*Την τοιαυτην ὁδον αναλυσιν καλουμεν, ὁιον αναπαλιν λυσιν.* To say, therefore, as many writers have done, that the analysis of a geometrical problem consists in *decomposing* or *resolving* it in such a manner as may lead to the discovery of the *composition* or synthesis;—is at once to speak vaguely, and to keep out of view the cardinal principle on which the utility of the method hinges. There is indeed one species of *decomposition* exemplified in the Greek geometry;—*that* which has for its object to distinguish all the various cases of a general problem; but this part of the investigation was so far from being included by the ancients in their idea of analysis, that they bestowed upon it an appropriate name of its own;—the three requisites to a complete solution being (according to Pappus) *αναλυσαι, και συνθειναι, και διοριζεσθαι κατα πτωσιν.*

[†] M. Lacroix. See the Introduction to his Elements of Geometry.

This misapplication of the words analysis, and synthesis, is not, indeed, attended with any serious inconveniences, similar to the errours occasioned by the loose phraseology of Condillac. It were surely better, however, that mathematicians should cease to give it the sanction of their authority, as it has an obvious tendency,—beside the injustice which it involves to the inestimable remains of Greek geometry,—to suggest a totally erroneous theory, with respect to the real grounds of the unrivalled and transcendent powers possessed by the modern *calculus*, when applied to the more complicated researches of physics.†

SECTION IV.

THE CONSIDERATION OF THE INDUCTIVE LOGIC RESUMED.

I.

Additional Remarks on the distinction between Experience and Analogy.—Of the grounds afforded by the latter for Scientific Inference and Conjecture.

In the same manner in which our external senses are struck with that resemblance between different *individuals* which gives rise to a common appellation, our superiour faculties of observation and reasoning enable us to trace those more distant and refined similitudes which lead us to comprehend different species under one common *genus*. Here, too, the principles of our nature, already pointed out, dispose us to extend our conclusions from what is familiar to what is comparatively unknown; and to reason from species to species, as from individual to individual. In both instances, the logical process of thought is nearly, if not exactly the same; but the common use of language has established a verbal distinction between them; our most correct writers being accustomed (as far as I have been able to observe) to refer the evidence of our conclusions, in the one case to *experience*, and in the other to *analogy*. The truth is, that the difference between these two denominations of evidence, when they are accurately analyzed, appears manifestly to be a difference, not in *kind* but merely in *degree;* the discriminative peculiarities of individuals invalidating the inference, as far as it rests on experience solely, as much as the characteristical circumstances which draw the line between different *species* and different *genera*.*

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* Histoire des Mathématiques, par Montucla, Tome Premier, pp. 175, 176.

† In the ingenious and profound work of M. De Gerando, entitled *Des Signes et de l'Art de Penser, considérés dans leur rapports mutuels*, there is a very valuable chapter on the Analysis and Synthesis of metaphysicians and of geometers. (See Vol. IV. p. 172.) The view of the subject which I have taken in the foregoing section, has but little in common

This difference in point of degree (it must at the same time be remembered) leads, where it is great, to important consequences.

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with that given by this excellent philosopher ; but in one or two instances, were we have both touched upon the same points, (particularly in the strictures upon the logic of Condillac) there is a general coincidence between our criticisms which adds much to my confidence in my own conclusions.

* In these observations on the import of the word *analogy*, as employed in philosophical discussions, it gives me great pleasure to find, that I have struck nearly into the same train of thinking with M Prévost. I allude more particularly to the following passage in his *Essais de Philosophie*.

"Le mot *Analogie*, dans l'origine, n'exprime que la ressemblance. Mais l'usage l'applique à une ressemblance éloignée : d'ou vient que les conclusions analogiques sont souvent hasardées, et ont besoin d'être déduites avec art. Toutes les fois donc que, dans nos raisonnemens, nous portons des jugemens semblables sur des objets qui n'ont qu'une ressemblance éloignée, nous raisonnons analogiquement. La ressemblance prochaine est celle qui fonde la première génèralisation, celle qu'on nomme *l'espèce*. On nomme éloignée la ressemblance qui fonde les généralisations superieures, c'est-à-dire, le *genre* et ses divers degrès. Mais cette definition n'est pas rigoureusement suivie.

"Quoiqu'il en soit, on conçoit des cas, entre lesquels la ressemblance est si parfaite, qu'il ne s'y trouve aucune diffèrence sensible, si ce n'est celle du tems et du lieu. Et il est des cas dans lesquels on appercoit beaucoup de ressemblance. mais où l'on decouvre aussi quelques différences indépendantes de la diversité du temps et du lieu. Lorsque nous ferons un jugement general, fondé sur la première espèce de ressemblance, nous dirons que nous usons de la *methode d'induction*. Lorsque la seconde espèce de ressemblance autorisera nos raisonnemens, nous dirons que c'est de la *méthode d'analogie* que nous faisons usage. On dit ordinairement que la méthode d'induction conclut du particulier au général, et que la methode d'analogie conclut du semblable au semblable. Si l'on analyse ces definitions, on verra que nous n'avons fait autre chose que leur donner de la précision."† (Essais de Philosophie, Tome II 202.)

See also the remarks on induction and analogy in the four following articles of M. Prévost's works.

†[The word *Analogy*, in its origin, expresses only *resemblance*. But custom has applied it to a distant resemblance. Hence Analogical conclusions are often ventured upon, when they ought to be drawn with great care and skill. Always, when in our reasonings we transfer like conclusions to objects which have no other than a distant resemblance, we *reason* analogically. The nearest resemblance is that which forms the first generalization;

In proportion as the resemblance between two cases diminishes in the palpable marks which they exhibit to our senses, our inferences from the one to the other are made with less and less confidence; and therefore it is perfectly right, that we should reason with more caution from *species* to *species*, than from *individual* to *individual* of the same kind. In what follows, accordingly, I shall avail myself of the received distinction between the words *experience* and *analogy*; a distinction which I have hitherto endeavoured to keep out of view, till I should have an opportunity of explaining the precise notion which I annex to it. It would, in truth, be a distinction of important use in our reasonings, if the common arrangements, instead of originating, as they have often done, in ignorance or caprice, had been really the result of an accurate observation and comparison of particulars. With all the imperfections of these arrangements, however, a judicious inquirer will pay so much regard to prevailing habits of thinking, as to distinguish very scrupulously what common language refers to experience from what it refers to analogy, till he has satisfied himself, by a diligent examination, that the distinction has, in the instance before him, no foundation in truth. On the other hand, as mankind are much more disposed to confound things which ought to be distinguished, than to distinguish things which are exactly or nearly similar, he will be doubly cautious in concluding, that all the knowledge which common language ascribes to experience is equally solid; or that all the conjectures which it places to the account of analogy are equally suspicious.

A different idea of the nature of analogy has been given by some writers of note; and it cannot be denied, that, in certain instances, it seems to apply still better than that proposed above. The two accounts however, if accurately analyzed, would be found to approach much more nearly, than they appear to do at first sight; or rather, I am inclined to think, that the one might be resolved into the other, without much straining or over refinement. But this is a question chiefly of speculative curiosity, as the general remarks which I have now to offer, will be found to hold with respect to analogy, considered as a ground of philosophical reasoning, in whatever manner the word is defined; provided only it be understood to express some sort of correspondence or affinity

this we call the *species*. We call that resemblance distant, which forms the next superior generalization; that is to say, the *Genus* and its various degrees. But this definition is not rigorously followed.

However this may be, we can conceive cases between which the resemblance is so perfect, that we discover no other difference but that of time and place. And there are cases in which we perceive much resemblance, but in which we discover also some diversities, independent of those of time and place. When we make a general judgment, founded upon the first species of resemblance, we say that we make use of the *method* of *induction*. When the second species of resemblance authorizes our reasonings, we say that it is the *method of analogy* which we use. We commonly say, that the method of induction concludes from particular to general, and that the method of analogy concludes from like to like. If we analyse those definitions, we shall find that we have done nothing but given them greater exactness.

between two subjects, which serves, as a principle of association or of arrangement, to unite them together in the mind.

According to Dr. Johnson, (to whose definition I allude more particularly at present) analogy properly means "a resemblance between things *with regard to some circumstances or effects*; as when "learning is said to *enlighten* the mind;—that is, to be to the mind "what light is to the eye, by enabling it to discover that which was "hidden before." The statement is expressed with a precision and justness not always to be found in the definitions of this author; and it agrees very nearly with the notion of analogy adopted by Dr. Ferguson,—that "things which have no resemblance to each other "may nevertheless be analogous; analogy consisting in a resemblance or correspondence of relations."* As an illustration of this, Dr. Ferguson mentions the analogy between the fin of a fish and the wing of a bird; the fin bearing the same relation to the water, which the wing does to the air. This definition is more particularly luminous, when applied to the anologies which are the foundation of the rhetorical figures of metaphor and allusion; and it applies also very happily to those which the fancy delights to trace between the material and the intellectual worlds; and which (as I have repeatedly observed,) are so apt to warp the judgment in speculating concerning the phenomena of the human mind.

The pleasure which the fancy receives from the contemplation of such correspondences, real or supposed, obviously presupposes a certain *disparity* or *contrast* in the natures of the two subjects compared; and, therefore, analogy forms an associating principle, specifically different from resemblance, into which Mr. Hume's theory would lead us to resolve it. An additional proof of this is furnished by the following consideration, That a resemblance of *objects or events* is perceived by *sense*, and, accordingly, has some effect even on the lower animals; a *correspondence* (or, as it is frequently called, a *resemblance*) of *relations*, is not the object of sense, but of *intellect*, and consequently, the perception of it implies the exercise of reason.

Notwithstanding, however, the radical distinction between the notions expressed by the words resemblance and analogy, they may often approach very nearly to each other in their meaning; and cases may even be conceived in which they exactly agree. In proof of this, it is sufficient to remark, that in objects, the parts of which respectively exhibit that correspondence which is usually distinguished by the epithet *analogous*, this correspondence always deviates, less or more, from an exact conformity or identity; in so much, that it sometimes requires a good deal of consideration to trace in detail the parallel circumstances, under the disguises which they borrow from their diversified combinations. An obvious instance of this occurs when we attempt to compare the bones and joints in the leg and foot of a man with those in the leg and foot of a horse. Were the correspondence in all the *relations* perfectly exact, the *resemblance* between the two objects would be manifest even to sense; in the very same manner that, in geometry, the *similitude* of two triangles is a necessary consequence of a precise correspondence in the *relations* of their homologous sides.*

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* Principles of Moral and Political Science. Vol. I. p. 107.

This last observation may serve, in some measure, to justify an assertion which was already hazarded,—That the two definitions of analogy formerly mentioned, are very nearly allied to each other;—in as much as it shows, by a more careful analysis than has commonly been applied to this subject, that the sensible *dissimilitude* between things of different *species* arises chiefly from the want of a palpable conformity in the *relations* of their constituent parts. Conceive *that* more remote correspondence which reason or fancy traces between the parts of the one and the parts of the other, gradually to approach, nearer and nearer, to the same standard; and it is evident, that, in the course of the approximation, you will arrive at that degree of manifest resemblance, which will bring them under the same generic name; till at last, by continuing this process of the imagination, the one will become a correct picture or image of the other, not only in its great outlines, but in its minutest details.

From this view of the subject, too, as well as from the former, it appears, how vague and ill-defined the metaphysical limits are which separate the evidence of analogy from that of experience; and how much room is left for the operation of good sense, and of habits of scientific research, in appreciating the justness of that authority which, in particular instances, the popular forms of speech may assign to either.

The illustrations which I have to offer of this last remark, in so far as it relates to *experience*, may, I think, be introduced more usefully afterwards; but the vague conceptions which are generally annexed to the word *analogy*, together with the prevailing prejudices against it, as a ground of philosophical reasoning, render it proper for me, before proceeding any farther, to attempt the correction of some popular mistakes connected with the use of this obnoxious term.

It is not necessary, for the purposes which I have at present in view, to investigate very curiously the principles which, in the first instance, dispose the mind to indulge in analogical conjectures from the known to the unknown. It is sufficient to observe, that this disposition, so far from being checked, receives additional encouragement from habits of philosophical study;—the natural tendency of these habits being only to guide it into the right path, and to teach it to proceed cautiously, according to certain general rules, warranted by experience.

The encouragement which philosophical pursuits give to this natural disposition, arises chiefly from the innumerable proofs they afford of that systematical unity and harmony of design which are every where conspicuous in the universe. On this unity of design is founded the most solid argument which the light of reason supplies for the unity of God; but the knowledge of *the general fact* on which that argument proceeds is not confined to the student of theology. It forces itself irresistibly on the thoughts of all who are familiarly conversant with the phenomena, either of the material or of the moral world; and is recognized as a principle of reasoning, even by those who pay little or no attention to its most sublime and important application.

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* See note (Q.)

It is well known to all who have the slightest acquaintance with the history of medicine, that the anatomical knowledge of the ancients was derived almost entirely from analogical conjectures, founded on the dissection of the lower animals;* and that, in consequence of this, many misrepresentations of facts, and many erroneous theories (blended, however, with various important truths) were transmitted to the physiologists of modern Europe. What is the legitimate inference to be deduced from these premises? Not surely, that analogy is an organ of *no* use in the study of nature; but that, although it may furnish a rational ground of conjecture and inquiry, it ought not to be received as direct evidence, where the fact itself lies open to examination; and that the conclusions to which it leads ought, in every case, to be distrusted, in proportion as the subjects compared depart from an exact coincidence in all their circumstances.

As our knowledge of nature enlarges, we gradually learn to combine the presumptions arising from analogy, with other general principles by which they are limited and corrected. In comparing, for example, the anatomy of different tribes of animals, we invariably find, that the differences in their structure have a reference to their way of life, and to the habits for which they are destined: so that, from knowing the latter, we might be able, on some occasions, to frame conjectures *a priori* concerning the former. It is thus, that the form of the teeth, together with the length and capacity of the intestines, vary in different species, according to the quality of the food on which the animal is to subsist. Similar remarks have been made on the different situation and disposition of the *mammae*, according as the animal is uniparous, or produces many at a birth;—on the structure and direction of the external ear, according as the animal is rapacious, or depends for security on his speed;—on the mechanism of the pupil of the eye, according as the animal has to search for his food by day or by night,—and on various other organs in the bodily economy, when compared with the functions which they are intended to perform. If, without attending to circumstances of this sort, a person should reason confidently from the anatomy of one species to that of another, it cannot be justly said, that analogy is a deceitful guide, but that he does not know how to apply analogy to its proper purpose. In truth, the very consideration which gives to the argument from analogy its chief force, points here manifestly to the necessity of some modification of the original conclusion, suited to the diversity of the case to which it is to be applied.

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* "If we read the works of Hippocrates with impartiality, and apply his accounts of the parts to what we *now* know of the human body, we must allow his descriptions to be imperfect, incorrect, sometimes extravagant, and often unintelligible, that of the bones only excepted. He seems to have studied these with more success than the other parts, and tells us, that he had an opportunity of seeing a human skeleton." . . .

"Erasistratus and Herophilus, two distinguished anatomists at Alexandria, were probably the first who were authorized to dissect human bodies. Their voluminous works are all lost; but they are quoted by Galen, almost in every page." . . .

"What Galen principally wanted was opportunities of dissecting human bodies: for his subject was most commonly some quadruped, whose structure was supposed to come nearest to the human." . . . .

"About the year 1540, the great Vesalius appeared. He was equally laborious in reading the ancients, and in dissecting bodies; and in making the comparison, he could not but see, that many of Galen's descriptions were erroneous.—The spirit of opposition and emulation was presently roused, and many of his contemporaries endeavoured to defend Galen at the expense of Vesalius. In their disputes they made their appeals to the human body; and thus in a few years our art was greatly improved. And Vesalius being detected in the very fault which he condemns in Galen, to wit, describing from the dissections of brutes, and not of the human body, it exposed so fully that blunder of the older anatomists, that, in succeeding times, there has been little reason for such complaint."

Introductory Lectures, delivered by Dr. William Hunter to his last course of anatomy. (London, 1784.) pp. 13, 19, 25, 40.

It is remarked by Cuvier, that "a canine tooth, adapted to tear "flesh, was never found combined, in the same animal, with a hoof, "fit for supporting the weight of the body, but totally useless as a "weapon to a beast of prey."—"Hence (he observes) the rule that "every hoofed animal is herbivorous;—and hence (as corollaries "from this general principle) the maxims, that a hoofed foot indi"cates grinding teeth with flat surfaces, a long alimentary canal, a "large stomach, and often more stomachs than one, with many "other similar consequences.

"The laws which regulate the relations between different sys"tems of organs, (continues this very ingenious and sound philoso"pher,) have the same influence on the different parts of the same "system, and connect together its different modifications, by the "same necessary principles. In the alimentary system, especially, "where the parts are large and numerous, these rules have their "most striking applications. The form of the teeth, the length, "the convolutions, the dilatations of the alimentary canal, the num"ber and abundance of the gastric liquors, are in the most exact "adaptation to one another, and have similar fixed relations to the "chemical composition, to the solid aggregation, and to the solubi"lity of the aliment; in so much that, from seeing one of the parts "by itself, an experienced observer could form conclusions tolerably "accurate, with respect to the conformation of the other parts of "the same system, and might even hazard more than random con"jectures with respect to the organs of other functions.

"The same harmony subsists among the different parts of the "system of organs of motion. As all the parts of this system act "mutually, and are acted upon, especially when the whole body of "the animal is in motion, the forms of all the different parts are "strictly related. There is hardly a bone that can vary in its sur-

“ faces, in its curvatures, in its protuberances, without corresponding “ variations in other bones; and in this way, a skilful naturalist “ from the appearance of a single bone, will be often able to con- “ clude, to a certain extent, with respect to the form of the whole “ skeleton to which it belonged.

“ These laws of co-existence (Cuvier adds) which have just been “ indicated, are deduced by reasoning from our knowledge of the “ reciprocal influence of the functions, and of the use of the different “ organs of the body. Having confirmed them by observation, we “ are enabled, in other circumstances, to follow a contrary route: “ and, when we discover constant relations of form between particu- “ lar organs, we may safely conclude, that they exercise some action “ upon one another; and we may thus be frequently led to form just “ conjectures with respect to their uses.—It is, indeed, chiefly from “ the attentive study of these relations, and from the discovery of “ relations which have hitherto escaped our notice, that physiology “ has reason to hope for the extension of her limits; and accord- “ ingly, the comparative anatomy of animals is to her one of the “ most fruitful sources of valuable discovery.”*

The general result of these excellent observations is, that the improvement of physiology is to be expected chiefly from lights furnished by analogy; but that, in order to follow this guide with safety, a cautious and refined logic is still more necessary than in conducting those reasonings which rest on the direct evidence of experience. When the ancient anatomists, without any examination of the facts within their reach, or any consideration of the peculiar functions likely to be connected with man's erect form and rational faculties, drew inferences concerning his internal frame, merely from the structure of the quadrupeds; the errours into which they fell,—so far from affording any solid argument against the use of analogy when judiciously employed,—have only pointed out to their successors the necessity of a more discriminating and enlightened application of it in future; and have ultimately led to the discovery of those comprehensive Laws of the Animal Economy, which, by reconciling apparent anomalies with the consistency and harmony of *one grand design*, open, at every successive step of our progress, more enlarged and pleasing views of the beneficent wisdom of Nature.

This speculation might be carried farther, by extending it to the various analogies which exist between the Animal and the Vegetable kingdoms, contrasted with those characteristical peculiarities by which they are respectively adapted to the purposes for which they are destined. It is, however, of more consequence, on the present occasion, to turn our attention to the analogies observable among many of the physical processes by which different effects are accomplished, or different phenomena produced, in the system of inanimate and unorganized matter. Of the existence of such analogies a satisfactory proof may be derived, from the acknowledged tendency of philosophical habits and scientific pursuits, to familiarize the mind with the order of nature, and to improve its penetration in anticipating future discoveries. A man conversant with physics and chemistry is much more likely than a stranger to these studies to form probable conjectures concerning those laws of nature which still remain to be examined. There is a certain character or *style* (if I may use the expression) in the operations of Divine Wisdom;—something which every where announces, amidst an infinite variety of detail, an inimitable unity and harmony of design; and in the perception of which *philosophical sagacity and genius* seem chiefly to consist. It is this which bestows a value so inestimable on the Queries of Newton.*

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* See the Introduction to the *Lecons d'Anatomie comparée de G. Cuvier*. The above translation is taken from a very interesting tract, entitled, An Introduction to the Study of the Animal Economy. (Edinburgh, 1801.)

This view of the numberless analogies displayed in that part of the universe which falls under our immediate notice, becomes more particularly impressive, when it is considered, that the same unity of design may be distinctly traced, as far as the physical researches of astronomers have extended. In the knowledge of this fact, we possess important moral lights, for which we are entirely indebted to the Newtonian school; the universal creed of antiquity having assumed as a principle, that the celestial phenomena are, in their nature and laws, essentially different from the terrestrial. The Persian Magi, indeed, are said to have laid down, as one of their maxims,—*συμπαθη ειναι τα ανω τοις κατω*;†—but that no maxim could stand in more direct opposition to the tenets of the Grecian philosophers, appears sufficiently from the general strain of their physical and astronomical theories. The modern discoveries have shown, with demonstrative evidence, how widely, in this fundamental assumption, these philosophers erred from the truth; and, indeed, it was a conjecture *à priori*, originating in some degree of scepticism with respect to it, that led the way to the doctrine of gravitation. Every subsequent step which has been gained in astronomical science has tended more and more to illustrate the sagacity of those views by which Newton was guided to this fortunate anticipation of the truth; as well as to confirm, upon a scale which continually grows in its magnitude, the justness of that magnificent conception of uniform design, which emboldened him to connect the physics of the Earth with the hitherto unexplored mysteries of the Heavens.

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* How very deeply Newton's mind was impressed with those ideas of analogy which I have here ventured to ascribe to him, appears from his own words. "Have not the small particles of bodies certain powers, virtues, or forces, by which they act at a distance, not only upon the rays of light for reflecting, refracting, and inflecting them, but also upon one another, for producing a great part of the phenomena of nature? For it is well known that bodies act one upon another, by the attractions of gravity, magnetism and electricity; *and these instances shew the tenor and course of nature, and make it not improbable but that there may be more attractive powers than these. For nature is very consonant and conformable to herself.*" See the 31*st* Query, at the end of his Optics.

In a subsequent part of this Query, he recurs to the same principle. "And thus *Nature will be very conformable to herself and very simple*; performing all the great motions of the heavenly bodies by the attraction of gravity which intercedes those bodies; and almost all the small ones of their particles, some other attractive and repelling powers, which intercede the particles."

† [Things above have a resemblance to those below.]

Instructive and interesting, however, as these physical speculations may be, it is still more pleasing to trace the uniformity of design which is displayed in the economy of sensitive beings; to compare the arts of human life with the instincts of the brutes, and the instincts of the different tribes of brutes with each other; and to remark, amidst the astonishing variety of means which are employed to accomplish the same ends, a certain analogy characterize them all; or to observe, in the minds of different individuals of our own species, the workings of the same affections and passions, manifesting, among men of every age and of every country, the kindred features of humanity. It is this which gives the great charm to what we call *Nature* in epic and dramatic composition,—when the poet speaks a language "to which every heart is an echo," and which, amidst the manifold effects of education and fashion, in modifying and disguising the principles of our constitution, reminds all the various classes of readers or of spectators, of the existence of those moral ties which unite them to each other, and to their common parent.*

Nor is it only in the material and moral worlds, when considered as separate and independent systems, that this unity of design is perceptible. They mutually bear to each other numberless *relations*, which are more particularly remarkable, when we consider both, in their combined tendencies with respect to human happiness and improvement. There is also a more general analogy, which these two grand departments of nature exhibit, in the *laws* by which their phenomena are regulated, and a consequent analogy between the methods of investigation peculiarly applicable to each. I have already repeatedly taken notice of the erroneous conclusions to which we are liable, when we reason directly from the one to the other; or substitute the fanciful analogies between them, which language occasionally suggests, as a philosophical explanation of the phenomena of either. But it does not follow from this, that there is no analogy between the rules of inquiry, according to which they are to be studied. On the contrary, is is from the principles of inductive philosophizing, which are applicable to both in common, that we infer the necessity of resting our conclusions in each, upon its own appropriate phenomena.

I shall only add, to what has been now stated on the head of analogy, that the numberless references and dependencies between the material and the moral worlds, exhibited within the narrow sphere of our observation on this globe, encourage and even authorize us to conclude, that they both form parts of one and the same plan;—a conclusion congenial to the best and noblest principles of our nature, and which all the discoveries of genuine science unite in confirming. Nothing, indeed, could be more inconsistent with that irresistible disposition which prompts every philosophical inquirer to argue from the known to the unknown, than to suppose that, while all the different bodies which compose the *material* universe are manifestly related to each other, as parts of a connected *whole*, the *moral* events which happen on our planet are quite insulated; and that the rational beings who inhabit it, and for whom we may reasonably presume it was brought into existence, have no relation whatever to other intelligent and moral natures. The presumption unquestionably is, that there is one great *moral system*, corresponding to the *material system*; and that the connexions which we at present trace so distinctly among the sensible objects composing the one, are exhibited as so many intimations of some vast scheme, comprehending all the intelligent beings who compose the other. In this argument, as well as in numberless others which analogy suggests in favour of our future prospects, the evidence is precisely of the same sort with that, which first encouraged Newton to extend his physical speculations beyond the limits of the Earth. The sole difference is, that he had an opportunity of verifying the results of his conjectures by an appeal to sensible facts: but this accidental circumstance (although it certainly affords peculiar satisfaction and conviction to the astronomer's mind) does not affect the grounds on which the conjecture was *originally* formed, and only furnishes an experimental proof of the justness of the principles on which it proceeded. Were it not, however, for the palpable confirmation thus obtained of the Theory of Gravity, it would be difficult to vindicate against the charge of presumption, the mathematical accuracy, with which the Newtonians pretend to compute the motions, distances, and magnitudes of worlds, apparently so far removed beyond the examination of our faculties.*

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* Outlines of Moral Philosophy, pp. 198, 199. 3d edit.

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* "I know no author (says Dr. Reid) who has made a more just and a more happy use of analogical reasoning, than Bishop Butler, in his Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature. In that excellent work, the author does not ground any of the truths of religion upon Analogy, as their proper evidence. He only makes use of Analogy to answer objections against them. When objections are made against the truths of religion which may be made with equal strength against what we know to be true in the course of nature, such objections can have no weight." (Essays on the Intell. Powers, p. 54.)

To the same purpose it is observed by Dr. Campbell, that "analogical evidence is generally more successful in silencing objections than in evincing truth. Though it rarely refutes, it frequently repels refutation; like those weapons which, though they cannot kill the enemy, will ward his blows." (Phil. of Rhet. Vol. I. p. 145.)

This estimate of the force of analogical reasoning, considered as a weapon of controversy, is discriminating and judicious The occasion on which the logician wields it to the best advantage is, undoubtedly, in repelling the objections of an adversary. But after the foregoing observations, I may be permitted to express my doubts, whether both of these ingenious writers have not somewhat underrated the importance of analogy as a medium of proof, and as a source of new information.—I acknowledge, at the same time, that between the positive and the negative applications of this species of evidence, there is an essential difference. When employed to refute an objection, it may often furnish an argument irresistibly and unanswerably convincing: when employed as a medium of proof, it can never authorize more than a probable conjecture, inviting and encouraging farther examination. In some instances, however, the probability resulting from a concurrence of different analogies may rise so high, as to produce an effect on the belief scarcely distinguishable from moral certainty.

The foregoing observations have a close connexion with some reasonings hereafter to be offered in defence of the doctrine of *final causes.* They also throw additional light on what was remarked in a former chapter concerning *the unity of truth* ;—a most important fact in the theory of the human mind, and a fact which must strike every candid inquirer with increasing evidence, in proportion to the progress which he makes in the *interpretation of Nature.* Hence the effect of philosophical habits in animating the curiosity, and in guiding the inventive powers; and hence the growing confidence which they inspire in the ever consistent and harmonious conclusions of inductive science. It is chiefly (as Bacon has observed) from partial and desultory researches that scepticism arises; not only as such researches suggest doubts which a more enlarged acquaintance with the universe would dispel, but as they withdraw the attention from those comprehensive views which combine into a symmetrical fabric —all whose parts mutually lend to each other support and stability —the most remote, and seemingly the most unconnected discoveries. "(1)*Etenim symmetria scientiae, singulis scilicet partibus se invicem* "*sustinentibus*, est, et esse debet, vera atque expedita ratio refellendi objectiones minorum gentium: Contra, si singula axiomata, tanquam baculos fascis seorsim extrahas, facile erit ea infirmare, et "pro libito, aut flectere aut frangere. Num non in aula spatiosa "consultius foret, unum accendere cereum, aut lychnuchum suspendere, variis luminibus instructum, quo omnia simul perlustrentur, "quam in singulos angulos quaquaversus exiguam circumferre lucernam?"*

II.

Use and Abuse of Hypotheses in Philosophical Inquiries.—Difference between Gratuitous Hypotheses, and those which are supported by presumptions suggested by Analogy.—Indirect Evidence which a Hypothesis may derive from its agreement with the Phenomena.—Cautions against extending some of these conclusions to the Philosophy of the Human Mind.

As some of the reasonings in the former part of this Section may at first sight appear more favourabe to the use of Hypotheses, than is consistent with the severe rules of the Inductive Logic, it

* De Augment. Scient. Lib. i.

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(1) [For the unity of science, as the various parts mutually sustain each other, is and ought to be the truest and most expeditious method of refuting the objections of puny sciolists. On the other hand, if you exhibit axioms drawn out singly like sticks from a faggot, it will be easy to lessen their force, and to bend or break them at pleasure. In a spacious apartment, would it not be advisable, to light a single wax candle, or to suspend a chandalier, set round with various lamps, by which all things may be seen at one view, rather than to carry round a single taper to separately examine every nook and corner ?]

may not be superfluous to guard against any such misapprehensions of my meaning, by subjoining a few miscellaneous remarks and illustrations.

The indiscriminate zeal against hypotheses, so generally avowed at present by the professed followers of Bacon, has been much encouraged by the strong and decided terms in which, on various occasions, they are reprobated by Newton.[*] But the language of this great man, when he happens to touch upon logical questions, must not always be too literally interpreted. It must be qualified and limited, so as to accord with the exemplifications which he himself has given of his general rules. Of the truth of this remark, the passages now alluded to afford a satisfactory proof; for, while they are expressed in the most unconditional and absolute terms, so many exceptions to them occur in his own writings, as to authorize the conclusion, that he expected his readers would of themselves be able to supply the obvious and necessary comments. It is probable that, in these passages, he had more particularly in his eye the Vortices of Des Cartes.

"The votaries of hypotheses (says Dr. Reid) have often been "challenged to shew one useful discovery in the works of nature "that was ever made in that way."[†] In reply to this challenge, it is sufficient on the present occasion to mention the theory of Gravitation, and the Copernican system.[‡] Of the former, we have the testimony of Dr. Pemberton, that it took its first rise from a conjecture or hypothesis suggested by *analogy;* nor, indeed, could it be considered in any other light, till that period in Newton's life, when, by a calculation founded on the accurate measurement of the earth by Picard, he evinced the coincidence between the law which regulates the fall of heavy bodies, and the power which retains the Moon in her orbit. The Copernican system, however, furnishes a case still stronger, and still more directly applicable to our purpose; in as much as the only evidence which the author was able to offer in its favour, was the advantage which it possessed over every other hypothesis, in explaining, with simplicity and beauty, all the phenomena of the heavens. In the mind of Copernicus, therefore, this system was nothing more than a hypothesis ;—but it was a hypothesis conformable to the universal *analogy* of nature, always accomplishing her ends by the simplest means. " (1) C'est pour *la* " *simplicite* (says Bailly) que Copernic replaça le soleil au centre " du monde ; c'est pour elle que Kepler va détruire tous les épi- " cycles que Copernic avoit laissés subsister : peu de principes, " de grands moyens en petit nombre, des phénomènes infinis et " variés, voilà le tableau de l'univers."*

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[*] "Hypotheses non fingo. Quicquid enim ex phenomenis non deducitur hypothesis vocanda est, et hypotheses, seu metaphysicae, seu physicae, seu qualitatum occultarum, seu mechanicae, in philosophia experimentali locum non habent."[§] See the general *Scholium* at the end of the *Principia.*

[†] Essays on the Intellectual Powers of Man, p. 88, 4to edit. In another part of the same volume, the following assertion occurs. "Of all the discoveries that have been made concerning the inward structure of the human body, never one was made by conjecture.——The same thing may be said, with justice, of every other part of the works of God, wherein any real discovery has been made. Such discoveries have always been made by patient observation, by accurate experiments, or by conclusions drawn by strict reasoning from observations and experiments; and such discoveries have always tended to refute, but not to confirm, the theories and hypotheses which ingenious men had invented." Ibid. p. 49.

[‡] See note (R.)

[§] [I do not fabricate hypotheses, whatever is not deduced from phenomena, may be called an hypothesis, and hypotheses whether metaphysical or physical, or of occult qualities, or mechanical, have no place in experimental philosophy.]

* Histoire de l'Astronomie Moderne, Tome II. p. 2.

From this anticipation of simplicity in the laws of nature (a logical principle not less universally recognised among ancient than among modern philosophers,) Bailly has drawn an argument in support of his favourite hypothesis concerning the origin of the sciences. His words are these : " La simplicité n'est pas essentiellement un principe, un axiôme, c'est le résultat des travaux ; ce n'est pas une idée de l'enfance du monde, elle appartient à la maturité des hommes ; c'est la plus grande des vérités que l'observation constante arrache à l'illusion des effets : ce ne peut être qu'un reste de la science primitive. Lorsque chez un peuple, possesseur d'une mythologie compliquée, et qui n'a d'autre physique que ces fables, les philosophes, voulant réduire la nature à un seul principe, annonceront que l'eau est la source de toutes choses, ou le feu l'agent universel, nous dirons à ces philosophes : vous parlez une langue que n'est pas la vôtre ; vous aves saisi par un instinct philosophique ces vérités au-dessus de votre siècle, de votre nation, et de vous-mêmes ; c'est la sagesse des anciens qui vous a été transmise par tradition."†—&c. &c. &c. —Ibid. p. 4.

To the general remark which introduces this passage I readily subscribe. The confidence with which philosophers anticipate the simplicity of Nature's laws is unquestionably the result of experience, and of experience alone ; and implies a far more extensive knowledge of her operations than can be expected from the uninformed multitude. The inference however, deduced from this, by the ingenious and eloquent, but sometimes too fanciful historian, is not a little precipitate. The passion for excessive simplification, so remarkably exemplified in the physical systems of the Greeks, seems to be sufficiently accounted for by their scanty stock of facts, combined with that ambition to explain every thing from the smallest possible number of data, which, in all ages of the world, has been one of the most common infirmities of genius. On the other hand, the principle in question, when stated in the form of a proposition, is of so abstract and metaphysical a nature, that it is highly improbable it should have survived the shock of revolutions which had proved fatal to the memory of particular discoveries. The arts, it has been frequently observed, are more easily transmitted by mere tradition, from one generation to another, than the speculative sciences ; and, for a similar reason, physical systems are far less likely to sink into oblivion than abstract maxims, which have no immediate reference to objects of sense, or to the ordinary concerns of life.

† [Simplicity is not essentially a principle, an axiom ; it is the result of study. It is not an idea belonging to the infancy of the world, but rather to the maturity of man. It is the greatest of truths which constant observation rescues from the confusion of a multitude of facts. It cannot but be a remnant of primitive science. When amongst a people, possessed of a complicated mythology, and who have no other philosophy than fables, the philosophers, desirous of reducing nature to one single principle, shall announce that water is the source of all things, or fire the universal agent, we shall say to these philosophers, you speak a language which is not your own ; you have seized by a philosophic instinct these truths so far above your age, your nation, and yourselves ; it is the wisdom of the ancients which has been transmitted to you by tradition, &c.]

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(1) [It was on account of the *simplicity* of the system, that Copernicus replaced the sun in the centre of the world. On this account Kepler proceeded to destroy the epicycles which Copernicus had permitted to remain. With few principles, with great means, but of a very limited number, with phenomena infinite and various ; behold the picture of the universe !]

According to this view of the subject, the confidence which we repose in Analogy rests ultimately on the evidence of experience; and hence an additional argument in favour of the former method of investigation when cautiously followed; as well as an additional proof of the imperceptible shades by which Experience and Analogy run into each other.

Nor is the utility of hypothetical theories confined to those cases in which they have been confirmed by subsequent researches: it may be equally great, where they have completely disappointed the expectations of their authors. Nothing, I think, can be juster than Hartley's remark, that "any hypothesis which possesses a sufficient degree of plausibility to account for a number of facts, helps us to digest these facts in proper order, to bring new ones to light, and to make *experimenta crucis* for the sake of future inquirers."[*] Indeed, it has probably been in this way, that most discoveries have been made; for although a knowledge of facts must be prior to the formation of a legitimate theory; yet a hypothetical theory is generally the best guide to the knowledge of connected and of useful facts.

The first conception of a hypothetical theory, it must always be remembered, (if the theory possesses any plausibility whatever) presupposes a general acquaintance with the phenomena which it aims to account for; and it is by reasoning synthetically from the hypothesis and comparing the deductions with observation and experiment, that the cautious inquirer is gradually led, either to correct it in such a manner as to reconcile it with facts or finally to abandon it as an unfounded conjecture. Even in this latter case, an approach is made to the truth in the way of *exclusion;* while, at the same time, an accession is gained to that class of associated and kindred phenomena, which it is his object to trace to their parent stock.[†]

In thus apologizing for the use of hypotheses, I only repeat in a different form the precepts of Bacon and the comments of some of his most enlightened followers. "The prejudice against hypotheses which many people entertain, (says the late Dr. Gregory) is

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[*] Observations on Man, Chap. i. Prop. v.

[†] "Illud interim monemus; ut nemo animo concidat, aut quasi confundatur, si experimenta, quibus incumbit, expectationi suae non respondeant. Etenim quod succedit, magis complaceat; at quod non succedit, saepenumero non minus informat. Atque illud semper in animo tenendum, *experimenta lucifera* etiam adhuc magis, quam fructifera ambienda esse. Atque de *literata experientia* haec dicta sint; quae *sagacitas* potius est, et odoratio quaedam venatica, quam *scientia*."[‡] De Augm. Scient. Lib. v. Cap. ii.

[‡] [In the mean time I give this advice, that no one lose his courage, or be confounded, if the experiments on which he labours, do not succeed according to his expectation. When they do succeed, they are indeed more pleasing, but often when they do not, they are not therefore less instructive. And we should keep in mind, that experiments which throw some light are not less to be coveted than those which actually produce fruit. This I speak of *learned experiment*, which is rather *sagacity*, and a scent as in the chase, than actual *knowledge*.]

"founded on the equivocal signification of a word. It is commonly "confounded with theory:—but a hypothesis properly means the "supposition of a principle, of whose existence there is no proof "from experience, but which may be rendered more or less probable by facts which are neither numerous enough, nor adequate to "infer its existence. When such hypotheses are proposed in the "modest and diffident manner that becomes mere suppositions or "conjectures, they are not only harmless, but even necessary for "establishing a just theory. *They are the first rudiments or anticipations of Principles.* Without these, there could not be useful observation, nor experiment, nor arrangement, because there "could be no motive or principle in the mind to form them. Hypotheses then only become dangerous and censurable, when they "are imposed on us for just principles; because, in that case, they "put a stop to further inquiry, by leading the mind to acquiesce in "principles which may as probably be ill as well founded."*

Another eminent writer has apologized very ingeniously, and I think very philosophically, for the hypotheses and conjectures which are occasionally to be found in his own works. The author I mean is Dr. Stephen Hales, who, in the preface to the second volume of his Vegetable Statics, has expressed himself thus:

"In natural philosophy, we cannot depend on any mere speculations of the mind; we can only reason with any tolerable certainty from proper data, such as arise from the united testimony of "many good and credible experiments.

"Yet it seems not unreasonable, on the other hand, though not "far to indulge, to carry our reasonings a little farther than the "plain evidence of experiments will warrant; for since at the utmost "boundaries of those things which we clearly know, a kind of "twilight is cast on the adjoining borders of *Terra Incognita*, it "seems reasonable, in some degree, to indulge conjecture *there*; "otherwise we should make but very slow advances, either by "experiments or reasoning. For new experiments and discoveries "usually owe their first rise only to lucky guesses and probable "conjectures; and even disappointments in these conjectures often "lead to the thing sought for."

To these quotations I shall add two short extracts from Dr. Hooke (the contemporary or rather the predecessor of Newton,) whose acute and original remarks on this subject reflect the greater credit on his talents, that they were published at a period, when the learned body of which he was so illustrious an ornament, seem plainly to have been more disposed to follow the letter of some detached sentences, than to imbibe the general spirit of Bacon's logic.

"There may be use of method in the collecting of materials, "as well as in the employment of them; for there ought to be "some end and aim, some predesigned module and theory; some "purpose in our experiments. And though this Society have

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* Lectures on the Duties and the Qualifications of a Physician.

"hitherto seemed to avoid and prohibit preconceived theories, and "deductions from particular and seemingly accidental experiments; "yet I humbly conceive, that such, if knowingly and judiciously "made, are matters of the greatest importance; as giving a charac-"teristic of the aim, use, and signification thereof; and without "which, many, and possibly the most considerable particulars, are "passed over without regard and observation.*

"Where the *data* on which our ratiocinations are founded are "uncertain and only conjectural, the conclusions or deductions "therefrom can at best be no other than probable, but still they "become more and more probable, as the consequences deduced "from them appear, upon examinations by trials and designed "observations, to be confirmed by fact or effect. So that the "effect is that which consummates the demonstration of the inven-"tion; and the theory is only an assistant to direct such an inqui-"sition, as may procure the demonstration of its existence or non-"existence."†

As an illustration of this last remark, Hooke mentions his anticipation of Jupiter's motion upon his axis, long before he was able, by means of a good telescope, to ascertain the fact. A much more remarkable instance, however, of his philosophical sagacity, occurs in his anticipation of that theory of the planetary motions, which, soon after, was to present itself, with increased and at length demonstrative evidence, to a still more inventive and powerful mind. This conjecture (which I shall state in his own words,) affords, of itself, a decisive reply to the undistinguishing censures which have so often been bestowed on the presumptuous vanity of attempting, by means of hypotheses, to penetrate into the secrets of nature.

"I will explain (says Hooke, in a communication to the Royal "Society in 1666) a system of the world very different from any "yet received. It is founded on the three following positions.

"1. That all the heavenly bodies have not only a gravitation of "their parts to their own proper centre, but that they also mutually "attract each other within their spheres of action.

"2. That all bodies having a simple motion, will continue to "move in a straight line, unless continually deflected from it by "some extraneous force, causing them to describe a circle, an "ellipse, or some other curve.

"3. That this attraction is so much the greater as the bodies are "nearer. As to the proportion in which those forces diminish by "an increase of distance, I own I have not discovered it, although "I have made some experiments to this purpose. I leave this to "others, who have time and knowledge sufficient for the task."

The argument in favour of Hypotheses might be pushed much farther, by considering the tentative or *hypothetical* steps by which the most cautious philosophers are often under the necessity of proceeding, in conducting inquiries strictly experimental. These cannot be better described than in the words of Boscovich, the slightest of whose logical hints are entitled to peculiar attention.—"In some instances, observations and experiments at once reveal to "us all that we wish to know. In other cases, we avail ourselves "of the aid of *hypotheses;—by which word, however, is to be under- "stood, not fictions altogether arbitrary, but suppositions conformable "to experience or to analogy.* By means of these, we are enabled "to supply the defects of our *data*, and to conjecture or divine the "path to truth; always ready to abandon our hypothesis, when "found to involve consequences inconsistent with fact. And indeed, "in most cases, I conceive this to be the method best adapted to "physics; a science, in which the procedure of the inquirer may "be compared to that of a person attempting to decypher a letter "written in a secret character; and in which, legitimate theories "are generally the slow result of disappointed essays, and of errors "which have led the way to their own detection."*

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* Hooke's Posthumous Works, p. 280.

† Ibid. p. 537. For another extract from the same work, see note (S.)

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* De Solis ac Lunae Defectibus. Lond. 1760. pp. 211, 212. For the continuation of the above passage, see note (T.)

Many remarks to the same purpose may be found in Bacon. The following happen at present to occur to my memory.

"Deo (*formarum* inditori et opifici) et fortasse angelis, competit, formas per affirmationem immediate nosse, atque ab initio contemplationis. Sed certe supra hominem est; cui tantum conceditur, procedere primo per *negativas*, et postremo loco desinere in *affirmativas*, post omnimodam exclusionem . . . . Post *rejectionem* et *exclusionem* debitis modis factam, secundo loco (tanquam in fundo) manebit (abeuntibus in fumum opinionibus volatilibus) *forma* affirmativa, solida, et vera. Atque hoc brevi dictu est, sed per multas ambages ad hoc pervenitur." (Nov. Org. Lib. II. Aphor. XV. XVI.)

"Prudens *interrogatio* quasi dimidium scientiae. Idcirco quo amplior et certior fuerit anticipatio nostra; eo magis directa et compendiosa erit investigatio." (De Aug. Scient. Lib. V. cap. 3.)

"Vaga experientia, et se tantum sequens, mera palpatio est, et homines potius stupefacit, quam informat."† (Nov. Org. Dib. I. Aphor. C.)

The reader who wishes to prosecute farther this speculation concerning the use of hypotheses, may consult with advantage three short but interesting memoirs upon Method, by the late M. Le Sage of Geneva, which M. Prevost has annexed as a supplement to his *Essais de Philosophie*. That I may not be supposed, however, to acquiesce in *all* this author's views, I shall mention two strong objections to which some of them appear to me to be liable.

1. In treating of the method of Hypothesis, Le Sage uniformly contrasts it with that of Analogy, as if the two were radically distinct, and even opposite in their spirit; whereas it seems evident, that some perception of analogy must have given birth to every hypothesis which possesses a sufficient degree of plausibility to deserve farther examination.

[† To God, the implanter and creator of *forms*, and perhaps to the angels, it is possible. to understand *forms* without any medium, by affirmation, and at the beginning of contemplation; but certainly this is beyond the faculties of man, who is only permitted, first, to proceed by *negatives*, and then to conclude in *affirmatives*, after rejections of every sort. . . After these rejections and exclusions have been properly effected, and false opinions have been evaporated into smoke, there will then remain as upon a sure foundation, a *form* affirmative, solid and true. Although this is stated easily and in a short space of time, yet we reach this point through many windings.

A well planned experiment is the half of knowledge. The more complete and certain therefore has been our anticipation of truth, the more direct and compendious will be our investigation.

Vague experiment, without an object, is mere groping in the dark, and rather stupefies than instructs.]

Nor is it solely by the erroneous results of his *own* hypotheses, that the philosopher is assisted in the investigation of truth. Similar lights are often to be collected from the errors of his predecessors; and hence it is, that accurate histories of the different sciences may justly be ranked among the most effectual means of accelerating their future advancement. It was from a review of the endless and hopeless wanderings of preceding inquirers, that Bacon inferred the necessity of avoiding every beaten track; and it was this which encouraged him,—with a confidence in his own powers amply justified by the event—to explore and to open a new path to the mysteries of nature: *Inveniam viam, aut faciam.* In this respect, the maturity of reason in the *species* is analogous to that in the *individual;* not the consequence of any sudden or accidental cause, but the fruit of reiterated disappointments correcting the mistakes of youth and inexperience. "There is no subject (says Fontenelle) "on which men ever come to form a reasonable opinion, till they "have once exhausted all the absurd views which it is possible to "take of it. What follies (he adds) should we not be repeating at "this day, if we had not been anticipated in so many of them by the "ancient philosophers!"—Those systems, therefore, which are false, are by no means to be regarded as altogether useless. That of Ptolemy (for example) as Bailly has well observed, is founded on a prejudice so natural and so unavoidable, that it may be considered as a necessary step in the progress of astronomical science; and if it had not been proposed in ancient times, it would infallibly have preceded, among the moderns, the system of Copernicus, and retarded the period of its discovery.

In what I have hitherto said in defence of the method of Hypothesis, I have confined myself entirely to its utility as an organ of investigation; taking all along for granted, that, till the principle assumed has been fairly inferred as a law of nature, from undoubted facts, none of the explanations which it affords are to be admitted as legitimate theories. Some of the advocates for this method have however gone much farther; asserting, that if a hypothesis be sufficient to account for all the phenomena in question, no other proof of its conformity to truth is necessary. "Supposing (says "Dr. Hartley) the existence of *the aether* to be destitute of all direct "evidence, still, if it serves to explain and account for a great "variety of phenomena, it will, by this means, have an indirect "argument in its favour. Thus, we admit the key of a cypher to "be a true one, when it explains the cypher completely; and the "decypherer judges himself to approach to the true key, in pro-"portion as he advances in the explanation of the cypher; and *this*

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2. In applying the rules of Mathematical Method to Physics, he makes far too little allowance for the essential difference between the two sciences. This is more particularly remarkable in his observations on the aid to be derived, in investigating the laws of nature, from *the method of Exclusions,*—so happily employed by Frenicle de Bessy (a French mathematician of the 17th century) in the solution of some very difficult problems relating to numbers.—See note (U.)

"without any direct evidence at all."[*] On another occasion, he observes, that "Philosophy is the art of *decyphering* the mysteries "of nature; and that every theory which can explain all the phenomena, has the same evidence in its favour, that it is possible the "key of a cypher can have from its explaining that cypher."[†]

The same very ingenious and plausible reasoning is urged by Le Sage in one of his posthumous fragments;[‡] and, long before the publication of Hartley's work, it had struck Gravesande so strongly, that, in his *Introductio ad Philosophiam*, he has subjoined to his chapter on the Use of Hypotheses, another on the Art of Decyphering. Of the merit of the latter it is no slight proof, that D'Alembert has inserted the substance of it in one of the articles of the *Encyclopédie*.[§]

In reply to Hartley's comparison between the business of the philosopher and that of the decypherer, Dr. Reid observes, that "to find the key requires an understanding equal or superior to "that which made the cypher. This instance, therefore, (he adds) "will *then* be in point, when he who attempts to decypher the works "of nature by a hypothesis, has an understanding equal or superior "to that which made them."[||]

This argument is not stated with the author's usual correctness in point of logic; in as much as the first proposition contrasts the sagacity of the decypherer with that of the contriver of the *cypher*; and the second, with that of the author of the *composition* decyphered. Nor is this all. The argument proceeds on the supposition, that, if the task of the scientific inquirer be compared to that of the decypherer, the views of the author of nature may, with equal propriety, be compared to those of the inventor of the cypher. It is impossible to imagine that this was Hartley's idea. The object of true philosophy is, in no case, presumptuously to divine an alphabet of *secret* characters or cyphers, purposely employed by infinite Wisdom to *conceal* its operations; but, by the diligent study of facts and analogies legible to all, to discover the key which infinite Wisdom has itself prepared for the interpretation of its own laws. In other words, its object is, to concentrate and to cast on the unknown parts of the universe, the lights which are reflected from those which are known.

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[*] Observations on Man, Vol. I. pp. 15, 16. (4th edit.)

[†] Ibid. p. 350. The section from which this quotation is taken (entitled "Of Propositions and the nature of Assent") contains various ingenious and just observations, blended with others strongly marked with the author's peculiar turn of thinking. Among these last may be mentioned his Theory of Mathematical Evidence, coinciding exactly with that which has since been proposed by Dr. Beddoes. Compare Hartley with pp. 108, 109 of this volume.

[‡] "N'admettons-nous pas pour vraie, la clef d'une lettre écrite en chiffres, ou celle d'une logogryphe; quand cette clef s'applique exactement à tous les caracteres dont il faut rendre raison?"[¶] Opuscules de G. L. Le Sage, relatifs a la Methode. See M. Prevost's Essais de Philosophie.

[§] Article *Déchiffrer*. See also D'Alembert's Oeuvres Posthumes. Tome II. p. 177.—Gravesande's Logic was published in 1736.

[||] Essays on the Intell. Powers, p. 88.

[¶] [Do we not admit as the true one that key of a cypher, or that of a puzzle, when this key exactly fits all the characters which we desire to explain.]

In this instance, as well as in others, where Reid reprobates hypotheses, his reasoning uniformly takes for granted, that they are wholly arbitrary and gratuitous. "If a thousand of the greatest wits (says he) that ever the world produced, were, *without any previous knowledge in anatomy*, to sit down and contrive how, and by what internal organs, the various functions of the human body are carried on—how the blood is made to circulate, and the limbs to move—they would not, in a thousand years, hit upon any thing like the truth."[*] Nothing can be juster than this remark; but does it authorize the conclusion, that, to an experienced and skilful anatomist, conjectures founded on analogy, and on the consideration of *uses*, are of no avail as media of discovery? The logical inference, indeed, from Dr. Reid's own statement, is, not against anatomical conjectures in general, but against the anatomical conjectures of those who are ignorant of anatomy.

The same reply may be made to the following assertion of D'Alembert; another writer, who, in my opinion, has, on various occasions, spoken much too lightly of analogical conjectures. "It may be safely affirmed, that a mere theorist (*un Physicien de Cabinet*) who, by means of reasonings and calculations, should attempt to divine the phenomena of nature, and who should afterwards compare his anticipations with facts, would be astonished to find how wide of the truth almost all of them had been."[†] If this observation be confined to those system-builders who, without any knowledge of facts, have presumed to form conclusions *a priori* concerning the universe, its truth is so obvious and indisputable, that it was hardly worth the while of this profound philosopher so formally to announce it. If extended to such men as Copernicus, Kepler, and Newton, and to the illustrious train who have issued from the Newtonion school, it is contradicted by numberless examples, of which D'Alembert could not fail to be perfectly aware.[‡]

The sagacity which guides the philosopher in conjecturing the laws of nature, has, in its metaphysical origin, a very near affinity to that

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[*] Essays on the Intell. Powers, p. 49.

[†] Mélanges de Litterature, &c. Tome V. § 6. (entitled Eclaircissement sur ce qui a été dit, &c. de l'art de conjecturer.)

[‡] Accordingly, in another part of the same article, he has said: "L'analogie, c'est-a-dire, la ressemblance plus ou moins grande des faits, le rapport plus ou moins sensible qu'ils ont entr'eux, est l'unique regle des physiciens, soit pour expliquer les faits connus, soit pour en découvrir de nouveaux."[§]

[§] [Analogy, that is to say, the resemblance more or less distinct, of facts, the relation more or less perceptible, which they hold towards each other, is the only rule of philosophers, whether to explain known facts or to discover new.]

acquired perception of human character, which is possessed by Men of the World. The conclusions of one individual with respect to the springs of action in the breast of another, can never on the most favourable supposition, amount to more than to a hypothesis supported by strong analogies; yet how different is the value of the hypothesis, according to the intellectual habits of him by whom it is formed! What more absurd and presumptuous than the theories of the cloistered schoolman concerning the moral or the political phenomena of active life! What more interesting and instructive than the slightest characteristical sketches from the hand of a Sully or of a Clarendon!

To these suggestions in vindication of hypotheses it may be added, that some of the reasonings which, with propriety, were urged against them a century ago, have already, in consequence of the rapid progress of knowledge, lost much of their force. It is very justly remarked by M. Prevost, that "at a period when science has "advanced so far as to have accumulated an immense treasure of "facts, the danger of hypotheses is less, and their advantages great-"er, than in times of comparative ignorance." For this he assigns three reasons. "1. The multitude of facts restrains Imagination, by "presenting, in every direction, obstacles to her wanderings; and, "by overturning her frail edifices. 2. In proportion as facts multi-"ply, the memory stands in greater need of the aid of connecting "or associating principles.* 3. The chance of discovering inte-"resting and luminous relations among the objects of our knowledge "increases with the growing number of the objects compared."†—The considerations already stated suggest a 4th reason in confirmation of the same general proposition:—That, by the *extension* of human knowledge, the scale upon which the Analogies of Nature may be studied, is so augmented as to strike the most heedless eye; while, by its *diffusion*, the perception of these analogies (so essential an element in the composition of inventive genius) is insensibly communicated to all who enjoy the advantages of a liberal education. Justly, therefore, might Bacon say, "(1) Certo sciant homi-"nes, artes inveniendi solidas et veras adolescere et incrementa su-"mere cum ipsis inventis."

But although I do not think that Reid has been successful in his attempt to refute Hartley's argument, I am far from considering that argument as sound or conclusive. My chief objections to it are the two following.

1. The cases compared are by no means parallel. In that of the *cypher*, we have *all* the facts before us; and, if the key explains

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* With respect to the utility of hypothetical theories, as *adminicles* to the natural powers of memory, see the former volume of this work, Chapter vi. Sections 3 and 4.

† See note (X.)

(1) [We may conclude with certainty, that the real and efficacious methods of discovery acquire strength and extension from every new discovery.]

them, we may be certain, that nothing can directly contradict the justness of our interpretation. In *our physical researches*, on the other hand, we are admitted to see only a few detached sentences extracted from a volume, of the size of which we are entirely ignorant. No hypothesis, therefore, how numerous soever the facts may be with which it tallies, can completely exclude the possibility of exceptions or limitations hitherto undiscovered

It must, at the same time, be granted, that the probability of a hypothesis increases in proportion to the number of phenomena for which it accounts, *and to the simplicity of the theory by which it explains them*;—and that, in some instances, this probability may amount to a moral certainty. The most remarkable example of this which occurs in the history of science is, undoubtedly, the Copernican system. I before observed, that at the period when it was first proposed, it was nothing more than a hypothesis; and that its only proof rested on its conformity, in point of simplicity, to the general economy of the Universe. "When Copernicus (says Mr. Maclau-"rin) considered the form, disposition and motions of the system, as "they were then represented after Ptolemy, he found the whole "void of order, symmetry, and proportion; like a piece (as he ex-"presses himself) made up of parts copied from different originals, "which, not fitting each other, should rather represent a monster "than a man. He therefore perused the writings of the ancient "philosophers, to see whether any more rational account had ever "been proposed of the motions of the Heavens. The first hint he "had was from Cicero, who tells us, in his Academical Questions, "that Nicetas, a Syracusian, had taught that the earth turns round "on its axis, which made the whole heavens appear to a spectator "on the earth to turn round it daily. Afterwards, from Plutarch "he found, that Philolaus the Pythagorean had taught that the earth "moved annually round the sun. He immediately perceived, that, "by allowing these two motions, all the perplexity, disorder, and "confusion he had complained of in the celestial motions, vanished; "and that, instead of these, a simple regular disposition of the or-"bits, and a harmony of the motions appeared, worthy of the great "Author of the world."*

Of the truth of this hypothesis, the discoveries of the last century have afforded many new proofs of a direct and even demonstrative nature; and yet, it may be fairly questioned, whether to Copernicus and Galileo, the analogical reasoning stated in the preceding quotation, did not, of itself, appear so conclusive, as to supersede the necessity of any farther evidence. The ecclesiastical persecution which the latter encountered in defence of his supposed heresy, sufficiently evinces the faith which he reposed in his astronomical creed.

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* Account of Newton's Philosophical Discoveries, p 45. (2d edit)

This presumptive argument, as it presented itself to the mind of Copernicus, is thus stated by Bailly. "Les hommes sentent que la nature est simple; les stations et les rétrogradations des planetes offroient des apparences bizarres; le principe, qui les ramenoit, à une marche simple, et naturelle, *ne pouvoit être qu'une vérité*."† Hist. de l'Astron. Mod. Tom. I. p. 351.

† [Men perceive that nature is simple. The stations and retrograde motions of the planets exhibited irregular and confused appearances; that principle, therefore, which reduces them to a simple and natural motion, *could not but be true*.]

It is, however, extremely worthy of remark, with respect to the Copernican system, that it affords no illustration whatever of the justness of Hartley's logical maxim. The Ptolemaic system was not demonstrably *inconsistent* with any phenomena known in the sixteenth century; and, consequently, the presumption for the new hypothesis did not arise from its exclusive coincidence with the facts, but from the simplicity and beauty which it possessed as a theory. The inference to be deduced from it is, therefore, *not* in favour of hypotheses in general, but of hypotheses sanctioned by analogy.

The fortunate hypothesis of a Ring encircling the body of Saturn, by which Huyghens accounted, in a manner equally simple and satisfactory, for a set of appearances which, for forty years, had puzzled all the astronomers of Europe, bears, in all its circumstances, a closer resemblance than any other instance I know of, to the key of a cypher. Of its *truth* it is impossible for the most sceptical mind to entertain any doubt, when it is considered, that it not only enabled Huyghens to explain all the *known* phenomena, but to predict those which were afterwards to be observed. This instance, accordingly, has had much stress laid upon it by different writers, particularly Gravesande and Le Sage.[*] I must own, I am somewhat doubtful, if the discovery of a key to so limited and insulated a class of optical facts, authorizes any valid argument for the employment of mere hypotheses, to decypher the complicated phenomena resulting from the general laws of nature. It is, indeed, an example most ingeniously and happily selected; but would not perhaps have been so often resorted to, if it had been easy to find others of a similar description.

2. The chief objection, however, to Hartley's comparison of the theorist to the decypherer is, that there are few, if any, physical hypotheses, which afford the *only* way of explaining the phenomena to which they are applied; and therefore, admitting them to be perfectly consistent with all the known facts, they leave us in the same state of uncertainty, in which the decypherer would find himself, if he should discover a variety of keys to the same cypher. Des Cartes acknowledges, that the same effect might, upon the principles of his philosophy, admit of manifold explanations; and that nothing perplexed him more than to know which he ought to adopt, in preference to the others. "The powers of nature (says he) I "must confess, are so ample, that no sooner do I observe any parti-"cular effect, than I immediately perceive that it may be deduced

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[*] Gravesande, Introd. ad Philosoph. §§ 979, 985.

Opuscules de la Sage, published by M. Prevost. Premiere Mémoire, § 25. The latter writer mentions the theory in question, as a hypothesis which received no countenance whatever from the analogy of any preceding astronomical discovery.

"from *my* principles, in a variety of different ways; and nothing, "in general, appears to me more difficult, than to ascertain by which "of these processes it is really produced."* The same remark may (with a very few exceptions) be extended to every hypothetical theory which is unsupported by any collateral probabilities arising from experience or analogy; and it sufficiently shews, how infinitely inferior such theories are, in point of evidence, to the conclusions obtained by the art of the decypherer. The principles, indeed, on which this last art proceeds, may be safely pronounced to be nearly infallible.

In these strictures upon Hartley, I have endeavoured to do as much justice as possible to his general argument, by keeping entirely out of sight the particular purpose which it was intended to serve. By confining too much his attention to this, Dr. Reid has been led to carry, farther than was necessary or reasonable, an indiscriminate zeal against every speculation to which the epithet *hypothetical* can, in any degree, be applied. He has been also led to overlook the essential distinction between hypothetical inferences from one department of the Material World to another, and hypothetical inferences from the Material World to the Intellectual. It was with the view of apologizing for inferences of the latter description, that Hartley advanced the logical principle which gave occasion to the foregoing discussion; and therefore, I apprehend, the proper answer to his argument is this:—Granting your principle to be true in all its extent, it furnishes no apology whatever for the Theory of Vibrations. If the science of mind admit of any illustration from the aid of hypotheses, it must be from such hypotheses alone as are consonant to *the analogy of its own laws*. To assume, as a fact, the existence of analogies between these laws and those of matter, is to sanction that very prejudice which it is the great object of the inductive science of mind to eradicate.

I have repeatedly had occasion, in some of my former publications, to observe, that the names of almost all our mental powers and operations are borrowed from sensible images. Of this number are intuition; the discursive faculty; attention; reflection; conception; imagination; apprehension; comprehension; abstraction; invention; capacity; penetration; acuteness. The case is precisely similar with the following terms and phrases, relative to a different class of mental phenomena;—inclination; aversion; deliberation; pondering; weighing the *motives* of our actions; yielding to that *motive* which is the strongest ;—expressions (it may be remarked in passing) which, when employed without a very careful analysis of their import, in the discussion concerning the liberty of the will, gratuitously prejudge the very point in dispute ; and give the semblance of demonstration, to what is, in fact, only a series of identical propositions, or a sophistical circle of words.*

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* Dissertatio de Methodo. In the sentence immediately following, Des Cartes mentions the general rule which he followed, when such an embarrassment occurred. "Hinc aliter me extricare non possum, quàm si rursus aliqua experimenta quaeram: quae talia sint, ut eorum idem non sit futurus eventus, si hoc modo quam si illo explicetur."† The rule is excellent; and it is only to be regretted, that so few exemplifications of it are to be found in his writings.

† [From this difficulty I am not able to extricate myself, otherwise, than by having recourse to other experiments, of such a nature, that their issue may not be the same, if unfolded in the present rather than the former manner.]

That to the apprehensions of uneducated men, such metaphorical or analogical expressions should present *the images* and *the things typified*, inseparably combined and blended together, is not wonderful ; but it is the business of the philosopher to conquer these casual associations, and, by *varying* his metaphors, when he cannot completely lay them aside, to accustom himself to view the phenomena of thought in that naked and undisguised state in which they unveil themselves to the powers of consciousness and reflection. To have recourse therefore to the analogies suggested by popular language, for the purpose of *explaining* the operations of the mind, instead of advancing knowledge, is to confirm and to extend the influence of vulgar errors.

After having said so much in vindication of analogical conjectures as steps towards physical discoveries, I thought it right to caution my readers against supposing, that what I have stated admits of any application to analogical theories of the human mind. Upon this head, however, I must not enlarge farther at present. In treating of the inductive logic, I have studiously confined my illustrations to those branches of knowledge in which it has already been exemplified with indisputable success ; avoiding, for obvious reasons, any reference to sciences in which its utility still remains to be ascertained.

III.

Supplemental Observations on the words INDUCTION and ANALOGY, as used in Mathematics.

BEFORE dismissing the subjects of induction and analogy, considered as methods of reasoning in Physics, it remains for me to take some slight notice of the use occasionally made of the same terms in pure Mathematics. Although, in consequence of the very different natures of these sciences, the induction and analogy of the one cannot fail to differ widely from the induction and analogy of the other, yet, from the general history of language, it may be safely presumed, that this application to both of a common phraseology, has been suggested by certain *supposed* points of coincidence between the two cases thus brought into immediate comparison.*

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* " Nothing (says Berkeley) seems more to have contributed towards engaging men in controversies and mistakes with regard to the nature and operations of the mind, than the being used to speak of those things in terms borrowed from sensible ideas. For example, the will is termed the *motion* of the soul. This infuses a belief, that the mind of man is as a ball in motion, impelled and determined by the objects of sense, as necessarily as that is by the stroke of a racket." (Principles of Human Knowledge.)

It has been hitherto, with a very few if any exceptions, the universal doctrine of modern as well as of ancient logicians, that "no "mathematical proposition can be proved by induction" To this opinion Dr. Reid has given his sanction in the strongest terms; observing, that "although in a thousand cases, it should be found by "experience, that the area of a plane triangle is equal to the rect-"angle under the base and half the altitude, this would not prove "that it must be so in all cases, and cannot be otherwise; which is "what the mathematician affirms."†

That some limitation of this general assertion is necessary, appears plainly from the well-known fact, that *induction* is a species of evidence on which the most scrupulous reasoners are accustomed in their mathematical inquiries, to rely with implicit confidence; and which, although it may not *of itself* demonstrate that the theorems derived from it are *necessarily* true, is yet abundantly sufficient to satisfy any reasonable mind that they hold *universally*. It was by induction (for example) that Newton discovered the algebraical *formula* by which we are enabled to determine any power whatever, raised from a binomial root, without performing the progressive multiplications. The formula expresses a relation between the exponents and the co-efficients of the different terms, which is found to hold in all cases, as far as the table of powers is carried by actual calculation; from which Newton inferrred, that if this table were to be continued *in infinitum*, the same *formula* would correspond equally with every successive power. There is no reason to suppose that he ever attempted to prove the theorem in any other way; and yet, there cannot be a doubt, that he was as firmly satisfied of its being *universally* true, as if he had examined all the different demonstrations of it which have since been given.‡ Numberless other illustrations of the same thing might be borrowed, both from arithmetic and geometry.§

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* I have already observed (see p. 197 of this volume) that mathematicians frequently avail themselves of that sort of induction which Bacon describes "as proceeding by sim-"ple enumeration" The induction, of which I am now to treat, has very little in common with the other, and bears a much closer resemblance to that recommended in the Novum Organon.

† Essays on the Intell. Powers, p. 615. 4to edit.

‡ "The truth of this theorem was long known only by trial in particular cases, and by *induction* from *analogy*; nor does it appear that even Newton himself ever attempted any direct proof of it." (Hutton's Mathematical Dictionary, Art. *Binomial Theorem.*) For some interesting information with respect to the history of this discovery, see the very learned Introduction prefixed by Dr. Hutton to his edition of Sherwin's Mathematical Tables; and the second volume (p. 165) of the *Scriptores Logarithmici*, edited by Mr. Baron Maseres.

§ In the *Arithmetica Infinitorum* of Dr. Wallis, considerable use is made of the Method of Induction. "A l'aide d'une *induction* habilement ménagée (says Montucla) et du fil de *l'analogie* dont il sçut toujours s'aider avec succès, il soumit à la géométrie une multi-

Into what principles it may be asked, is the validity of such a proof in mathematics ultimately resolvable?—To me it appears to take for granted certain general logical maxims; and to imply a secret process of legitimate and conclusive reasoning, though not conducted agreeably to the rules of mathematical demonstration, nor perhaps formally expressed in words. Thus, in the instance mentioned by Dr. Reid, I shall suppose, that I have first ascertained experimentally the truth of the proposition in the case of an equilateral triangle; and that I afterwards find it to hold in all the other kinds of triangles, whether isosceles or scalene, right-angled, obtuse-angled, or acute angled. It is impossible for me not to perceive, that this property, having no connexion with any of the particular circumstances which discriminate different triangles from each other, *must* arise from something common to all triangles, and *must* therefore be a universal property of that figure. In like manner, in the *binomial theorem*, if the formula correspond with the table of powers in a variety of particular instances, (which instances agree in no other respect, but in being powers raised from the same binomial root,) we must conclude—and, I apprehend that our conclusion is perfectly warranted by the soundest logic,—that it is *this* common property which renders the theorem true in all these cases, and consequently, that it *must necessarily* hold in every other. Whether, on

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tude d'objets qui lui avoient échappé jusqu' alors."* (Hist. des Mathem. Tome II. p. 299.) This innovation in the established forms of Mathematical reasoning gave offence to some of his contemporaries; in particular, to M. de Fermat, one of the most distinguished geometers of the 17th century. The ground of his objection, however, (it is worthy of notice) was not any *doubt* of the conclusions obtained by Wallis; but because he thought that their truth might have been established by a more legitimate and elegant process. "Sa façon de demontrer, qui est fondée sur *induction* plutot que sur un raisonnement à la mode d'Archimede, fera quelque peine aux novices, qui veulent des syllogismes demonstratifs depuis le commencement jusqu' à la fin. Ce n'est pas que je ne l'approuve, mais toutes ses propositions pouvant être demontrées *viâ ordinariâ, legitimâ, et Archimedeâ*, en beaucoup moins de paroles, que n'en contient son livre, je ne scai pas pourquoi il a préféré cette manière à l'ancienne, qui est plus convainquante et plus elegante, ainsi que j'espere lui faire voir à mon premier loisir." Lettre de M. de Fermat a M. le Chev. Kenelme Digby.† (See Fermat's *Varia Opera Mathematica*, p. 191.) For Wallis's reply to these strictures, see his *Algebra*, Cap. lxxix.; and his *Commercium Epistolicum*.

In his *Opuscules* of M. le Sage, I find the following sentence quoted from a work of La Place, which I have not had an opportunity of seeing. The judgment of so great a master, on a logical question relative to his own studies, is of peculiar value. "La methode d'induction, *quoique excellente pour découvrir des vérités générales*, ne doit pas dispenser de les démontrer avec rigueur."‡ (Leçons données aux Ecoles Normales, Prem. Vol. p. 380.)

* [By the aid of an *induction* ably managed, and of the clue of *analogy* which he well knew how to use with success, he submits to the proof of geometry a multitude of objects which had formerly escaped him.]

† [This method of demonstration, which is founded upon induction rather than a method of reasoning resembling that of Archimedes, will give some trouble to novices, who wish for demonstrative syllogisms from the beginning to the end. It is not because I do not approve of this method, but as all his propositions may be demonstrated in *the ordinary, legitimate and Archimedæan way*, in fewer words than his book contains, I know not why he has preferred this method to the ancient, which is more convincing and more elegant, as I hope to make him see at my earliest leisure. Letter of M. Fermat to Sir Kenelm Digby.]

‡ [The method of *induction*, although excellent for the discovery of general truths, ought not to excuse us from demonstrating them rigorously.]

the supposition that we had never had any previous experience of demonstrative evidence, we should have been led, by the mere inductive process, to form the idea of *necessary truth*, may perhaps be questioned; but the slightest acquaintance with mathematics is sufficient to produce the most complete conviction, that whatever is *universally* true in that science, must be true *of necessity;* and, therefore, that a universal, and a necessary truth, are, in the language of mathematicians, synonymous expressions. If this view of the matter be just, the evidence afforded by mathematical induction must be allowed to differ radically from that of physical; the latter resolving ultimately into our instinctive expectation of the laws of nature, and consequently, never amounting to that demonstrative certainty, which excludes the possibility of anomalous exceptions.

I have been led into this train of thinking by a remark which La Place appears to me to have stated in terms much too unqualified;—"(1) Que la marche de Newton, dans la découverte de la gravitation "universelle, a été *exactement* la même, que dans celle de la formule "du binome." When it is recollected, that, in the one case, Newton's conclusion related to a *contingent*, and in the other to a *necessary* truth, it seems difficult to conceive, how the logical procedure which conducted him to both should have been *exactly* the same. In one of his queries, he has (in perfect conformity to the principles of Bacon's logic) admitted the possibility, that "God may vary the laws "of nature, and make worlds of several sorts, in several parts of "the universe." "At least (he adds) I see nothing of contradiction in all this."[*] Would Newton have expressed himself with equal scepticism concerning the universality of his binomial theorem; or admitted the possibility of a single exception to it, in the indefinite progress of actual involution? In short, did there exist the slightest shade of difference between the degree of his assent to this *inductive result*, and that extorted from him by a demonstration of Euclid?

Although, therefore, the mathematician, as well as the natural philosopher, may, without any blameable latitude of expression, be said to reason by *induction*, when he draws an inference from the known to the unknown, yet it seems indisputable, that, in all such cases, he rests his conclusions on grounds essentially distinct from those which form the basis of experimental science.

The word *analogy*, too, as well as *induction*, is common to physics, and to pure mathematics. It is thus we speak of the analogy running through the general properties of the different conic sections, with no less propriety than of the analogy running through the anatomical structure of different tribes of animals. In some instances, these mathematical analogies are collected by a species of *induction;* in others, they are inferred as consequences from more general

[*] Query 31.

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(1) [The process of Newton in his discovery of universal gravitation, has been exactly the *same as in that of the formula* of the Binomial Theorem.]

truths, in which they are included as particular cases. Thus, in the curves which have just been mentioned, while we content ourselves (as many elementary writers have done)* with deducing their properties from mechanical descriptions on a plane, we rise experimentally from a comparison of the propositions which have been separately demonstrated with respect to each curve, to more comprehensive theorems, applicable to all of them; whereas, when we begin with considering them in their common origin, we have it in our power to trace from the source, both their generic properties, and their specific peculiarities. The satisfaction arising from this last view of the subject can be conceived by those alone who have experienced it; although I am somewhat doubtful whether it be not felt in the greatest degree by such as, after having risen from the contemplation of particular truths to other truths more general, have been at last conducted to some commanding station, where the mutual connexions and affinities of the whole systems are brought, at once, under the range of the eye. Even, however, before we have reached this vantage-ground, the contemplation of the analogy, considered merely as a *fact*, is pleasing to the mind; partly, from the mysterious wonder it excites, and partly from the convenient generalization of knowledge it affords. To the experienced mathematician this pleasure is farther enhanced, by the assurance which the analogy conveys, of the existence of yet undiscovered theorems, far more extensive and luminous than those which have led him, by a process so indirect, so tedious, and comparatively so unsatisfactory, to his general conclusions.

In this last respect, the pleasure derived from analogy in mathematics, resolves into the same principle with that which seems to have the chief share in rendering the analogies among the different departments of nature so interesting a subject of speculation. In both cases, a powerful and agreeable *stimulus* is applied to the curiosity, by the encouragement given to the exercise of the inventive faculties, and by the hope of future discovery, which is awakened and cherished. As the analogous properties (for instance) of the conic sections, point to some general theorems of which they are corollaries; so the analogy between the phenomena of Electricity and those of Galvanism irresistibly suggests a confident, though vague anticipation of some general physical law comprehending the phenomena of both, but differently modified in its sensible results by a diversity of circumstances.† Indeed, it is by no means impossible, that the pleasure we receive even from those analogies which are the foundation of poetical metaphor and simile, may be found resolvable, in part, into the satisfaction connected with the *supposed* discovery of truth, or the supposed acquisition of knowledge; the faculty of imagination giving to these illusions a momentary ascendant over the sober conclusions of experience; and gratifying the understanding with a flattering consciousness of its own force, or at least with a consolitary forgetfulness of its own weakness.

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* L'Hospital, Simson, &c.

† See note (Y.)

SECTION V.

Of certain misapplications of the words Experience and Induction in the phraseology of Modern Science.—Illustrations from Medicine and from Political Economy.

In the first Section of this Chapter, I endeavoured to point out the characteristical peculiarities by which the Inductive Philosophy of the Newtonians is distinguished from the hypothetical systems of their predecessors; and which entitle us to indulge hopes with respect to the permanent stability of their doctrines, which might be regarded as chimerical, if, in anticipating the future history of science, we were to be guided merely by the analogy of its revolutions in the ages that are past.

In order, however, to do complete justice to this argument, as well as to prevent an undue extension of the foregoing conclusions, it is necessary to guard the reader against a vague application of the appropriate terms of *inductive science* to inquiries which have not been rigorously conducted, according to the rules of the *inductive logic.* From a want of attention to this consideration, there is a danger, on the one hand, of lending to sophistry or to ignorance the authority of those illustrious names whose steps they profess to follow; and, on the other, of bringing discredit on that method of investigation, of which the language and other technical arrangements have been thus perverted.

Among the distinguishing features of the new logic, when considered in contrast with that of the schoolmen, the most prominent is the regard which it professes to pay to *experience*, as the only solid foundation of human knowledge. It may be worth while, therefore, to consider, how far the notion commonly annexed to this word is definite and precise; and whether there may not sometimes be a possibility of its being employed in a sense more general and loose, than the authors, who are looked up to as the great models of inductive investigation, understood it to convey.*

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* As the reflections which follow are entirely of a practical nature, I shall express myself (as far as is consistent with a due regard to precision) agreeably to the modes of speaking in common use; without affecting a scrupulous attention to some speculative distinctions, which, however curious and interesting, when considered in connexion with the Theory of the Mind, do not lead to any logical conclusions of essential importance in the conduct of the Understanding. In such sciences, for example, as Astronomy, Natural Philosophy, and Chemistry, which rest upon phenomena open to the scrutiny of every inquirer, it would obviously be puerile in the extreme to attempt drawing the line between facts which have been ascertained by our own personal observation, and those which we have implicitly adopted upon our faith in the universal consent of the scientific world The evidence, in both cases, may be equally irresistible; and sometimes the most cautious reasoners may justly be disposed to consider that of testimony as the least fallible of the two.

By far the greater part, indeed, of what is commonly called experimental knowledge, will be found, when traced to its origin, to resolve entirely into our confidence in the judgment and the veracity of our fellow-creatures; nor (in the sciences already mentioned) has this identification of the evidence of testimony with that of experience, the slightest tendency to affect the legitimacy of our inductive conclusions.

In the course of the abstract speculations contained in the preceding section, I have remarked, that although the difference between the two sorts of evidence, which are commonly referred to the separate heads of *experience* and of *analogy*, be rather a difference in *degree* than in *kind*, yet that it is useful to keep these terms in view, in order to mark the contrast between cases which are separated from each other by a very wide and palpable interval;—more especially, to mark the difference between an argument from individual to individual of the same species, and an argument from species to species of the same genus. As this distinction, however, when accurately examined, turns out to be of a more vague and popular nature than at first sight appears, it is not surprising that instances should occasionally present themselves, in which it is difficult to say, of the evidence before us, to which of these descriptions it ought to be referred. Nor does this doubt lead merely to a question concerning phraseology: it produces a hesitation which must have some effect even on the judgment of a philosopher: the maxims to which we have been accustomed, in the course of our early studies, leading us to magnify the evidence of *experience* as the sole test of truth; and to depreciate that of *analogy*, as one of the most fertile sources of errour. As these maxims proceed on the supposition, that the respective provinces of both are very precisely defined, it is evident, that, admitting them to be perfectly just in themselves, much danger may still be conceivable from their injudicious application. I shall endeavour to illustrate this remark by some familiar instances; which, I trust, will be sufficient to recommend it to the farther consideration of future logicians. To treat of the subject with that minuteness of detail which is suited to its importance, is incompatible with the subordinate place which belongs to it in my general design.

It is observed by Dr. Reid,* that "in medicine, physicians must, "for the most part, be directed in their prescriptions by *analogy*. "The constitution of one human body is so like to that of another, "that it is reasonable to think, that what is the cause of health or

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In some other branches of knowledge, (more particularly in those political doctrines which assume as incontrovertible *data* the details of ancient history) the authority of testimony is, for obvious reasons, much more questionable; and to dignify it, in these, with the imposing character of *experience*, is to strengthen one of the chief bulwarks of popular prejudices. This view of the subject, however, although well entitled to the attention of the logician, has no immediate connexion with my present argument; and accordingly I shall make no scruple, in the sequel, to comprehend, under the name of *experience*, the grounds of our assent to all the *facts* on which our reasonings proceed, provided only that the certainty of these facts be, on either supposition, equally indisputable.

The logical errours which it is the aim of this section to correct, turn upon a still more dangerous latitude in the use of this word; in consequence of which, the authority of *experience* comes insensibly to be extended to innumerable opinions resting solely on *supposed analogies*; while, not unfrequently, the language of Bacon is quoted in bar of any theoretical argument on the other side of the question.

I have added this note, partly to obviate some criticisms, to which my own phraseology may, at first sight, appear liable; and partly to point out the connexion between the following discussion, and some of the foregoing speculations.

* Essays on the Intellect. Powers, p. 53.

" sickness to one, may have the same effect on another. And this
" (he adds) is generally found true, though not without some excep-
" tions."

I am doubtful if this observation be justified by the common use of language; which, as far as I am able to judge, uniformly refers the evidence on which a cautious physician proceeds, not to *analogy*, but to *experience*. The German monk, who, (according to the popular tradition) having observed the salutary effects of antimony upon some of the lower animals, ventured to prescribe the use of it to his own fraternity, might be justly said to reason analogically;—in as much as his experience related to one species, and his inference to another. But if, after having thus poisoned all the monks of his own convent, he had persevered in recommending the same mineral to the monks of another, the example of our most correct writers would have authorized us to say, (how far justly is a different question) that he proceeded in direct opposition to the evidence of *experience*.

In offering this slight criticism on Dr. Reid, I would be very far from being understood to say, that the common phraseology is more unexceptionable than his. I would only remark, that his phraseology on this occasion is almost peculiar to himself; and that the prevailing opinions, both of philosophers and of the multitude, incline them to rank the grounds of our reasoning in the medical art, at a much higher point in the scale of evidence, than what is marked by the word *analogy*. Indeed, I should be glad to know, if there be any one branch of human knowledge, in which men are, in general, more disposed to boast of the lights of *experience*, than in the practice of medicine.

It would, perhaps, have been better for the world, if the general habits of thinking and of speaking, had, in this instance, been more agreeable than they seem to be in fact to Dr. Reid's ideas;—or, at least, if some qualifying epithet had been invariably added to the word *experience*, to show with how very great latitude it is to be understood, when applied to the evidence on which the physician proceeds in the exercise of his art. The truth is, that, even on the most favourable supposition, this evidence, so far as it rests on experience, is weakened or destroyed by the uncertain conditions of every new case to which his former results are to be applied; and that, without a peculiar sagacity and discrimination in marking, not only the resembling, but the characteristical features of disorders, classed under the same technical name, his practise cannot, with propriety, be said to be guided by any one rational principle of decision, but merely by blind and random conjecture. The more successfully this sagacity and discrimination are exercised, the more nearly does the evidence of medical practice approach to that of *experience*; but, in every instance, without exception, so immense is the distance between them, as to render the meaning of the word *experience*, when applied to medicine, essentially different from its import in these sciences where it is possible for us, in all cases, by due attention to the circumstances of an experiment, to predict its result with an almost infallible certainty.*

Notwithstanding this very obvious consideration, it has become fashionable among a certain class of medical practitioners, since the lustre thrown on the inductive logic of Bacon by the discoveries of Newton and the researches of Boyle, to number their art with the other branches of experimental philosophy; and to speak of the difference between the empiric and the scientific physician, as if it were exactly analogous to that between the cautious experimentalist and the hypothetical theorist in physics. Experience, (we are told) and experience alone, must be our guide in medicine, as in all the other departments of physical knowledge:—Nor is any innovation, however rational, proposed in the established routine of practice, but an accumulation of alleged cases is immediately brought forward, as an experimental proof of the dangers which it threatens.

It was a frequent and favourite remark of the late Dr. Cullen,—that there are more false facts current in the world than false theories; and a similar observation occurs, more than once, in the *Novum Organon*. "Men of learning (says Bacon in one passage) are too "often led, from indolence or credulity, to avail themselves of mere "*rumours or whispers of experience*, as confirmations, and sometimes "as the very ground-work of their philosophy; ascribing to them "the same authority as if they rested on legitimate testimony. Like "to a government which should regulate its measures, not by the "official information received from its own accredited ambassadors, "but by the gossipings of newsmongers in the streets. Such, in "truth, is the manner in which the interests of philosophy, as far

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* "L'art de conjecturer en Médicine ne sauroit consister dans une suite de raisonnemens appuyés sur un vain systême. C'est uniquement l'art de comparer une maladie qu'on doit guérir, avec les maladies semblables qu'on a déja connues par son expérience ou par celle des autres. Cet art consiste même quelquefois à appercevoir un rapport entre des maladies qui paroissent n'en point avoir, comme aussi des différences essentielles, quoique fugitives, entre celles qui paroissent se ressembler le plus. Plus on aura rassemblé de faits, plus on sera en état de conjecturer heureusement; supposé néanmoins qu'on ait d'ailleurs cette justesse d'esprit que la nature seule peut donner.

"Ainsi le meilleur médecin n'est pas (comme le préjugé le suppose) celui qui accumule en aveugle et en courant beaucoup de pratique, mais celui qui ne fait que des observations bien approfondies, et que joint à ces observations le nombre beaucoup plus grand des observations faites dans tous les siecles par des hommes animés du même esprit que lui. Ces observations sont la véritable *expérience* du médicin."† D'Alembert, Eclaircissemens sur les Elémens de Philosophie, § vi.

† [The art of conjecture in medicine does not consist in a succession of reasonings founded upon a vain system. It is entirely the art of comparing one disease, which we propose to cure, with similar diseases with which we are already acquainted by our own experience or by that of others. This consists sometimes in perceiving a relation between diseases which seem to have none, as also of perceiving differences, which though transient are essential, between those which appear most similar. The more facts we are in possession of, the better are we qualified to conjecture with success; supposing always that we have that just method of thinking which nature alone can give.

Thus the best physician is not, as the vulgar suppose, he who blindly and hastily accumulates facts by practice, but he who makes none but well founded observations, and who joins to these a much greater number, made in all ages by men animated by the same spirit with himself. These observations are the true *experience* of the physician.]

" as *experience* is concerned, have been hitherto administered.—
" Nothing is to be found which has been duly investigated; nothing
" which has been verified by a careful examination of proofs;
" nothing which has been reduced to the standard of number,
" weight, or measure."*

This very important aphorism deserves the serious attention of those who, while they are perpetually declaiming against the uncertainty and fallacy of systems, are themselves employed in amassing a chaos of insulated particulars, which they admit upon the slenderest evidence. Such men, sensible of their own incapacity for scientific investigation, have often a malicious pleasure in destroying the fabrics of their predecessors; or, if they should be actuated by less unworthy motives, they may yet feel a certain gratification to their vanity, in astonishing the world with anomalous and unlooked for phenomena;—a weakness which results not less naturally from ignorance and folly, than a bias to premature generalization from the consciousness of genius.—Both of these weaknesses are undoubtedly adverse to the progress of science; but, in the actual state of human knowledge, the former is perhaps the more dangerous of the two.

In the practice of *medicine* (to which topic I wish to confine myself more particularly at present) there are a variety of other circumstances, which, abstracting from any suspicion of bad faith in those on whose testimony the credibility of facts depends, have a tendency to vitiate the most candid accounts of what is commonly dignified with the title of *experience*. So deeply rooted in the constitution of the mind is that disposition on which philosophy is grafted, that the simplest narrative of the most illiterate observer involves more or less of hypothesis; nay, in general, it will be found, that, in proportion to his ignorance, the greater is the number of conjectural principles involved in his statements.

A village-apothecary (and, if possible, in a still greater degree, an experienced nurse) is seldom able to describe the plainest case, without employing a phraseology of which every word is a theory; whereas a simple and genuine specification of the phenomena which mark a particular disease;—a specification unsophisticated by fancy, or by preconceived opinions, may be regarded as unequivocal evidence of a mind trained by long and successful study to the most difficult of all arts, that of the faithful *interpretation of nature.*

Independently, however, of all these circumstances, which tend so powerfully to vitiate the *data* whence the physician has to reason; and supposing his assumed facts to be stated, not only with the most scrupulous regard to truth, but with the most jealous exclusion of theoretical expressions, still the evidence upon which he proceeds is, at best, conjectural and dubious, when compared with what is required in chemistry or in mechanics. It is seldom, if ever, possible, that the description of any medical case can include all the circumstances with which the result was connected; and, therefore, how true soever the facts described may be; yet, when the conclusion to which they lead comes to be applied as a general rule in practice, it is not only a rule rashly drawn from one single experiment, but a rule transferred from a case imperfectly known, to another of which we are equally ignorant. Here, too, it will be found, that the evidence of experience is incomparably less in favour of the empiric, than of the cautious theorist; or rather, that it is by cautious theory alone, that experience can be rendered of any value. Nothing, indeed, can be more absurd than to contrast, as is commonly done, experience with theory, as if they stood in opposition to each other. Without theory, (or, in other words, without general principles, inferred from a sagacious comparison of a variety of phenomena,) experience is a blind and useless guide; while, on the other hand, a legitimate theory (and the same observation may be extended to hypothetical theories, supported by numerous analogies,) necessarily presupposes a knowledge of connected and well ascertained facts, more comprehensive, by far, than any mere empiric is likely to possess. When a scientific practitioner, accordingly, quits the empirical routine of his profession, in quest of a higher and more commanding ground, he does not proceed on the supposition that it is possible to supersede the necessity of experience by the most accurate reasonings *a priori;* but, distrusting conclusions which rest on the observation of this or that individual, he is anxious, by combining those of an immense multitude, to separate incidental conjunctions from established connexions, and to ascertain those laws of the human frame which rest on the universal experience of mankind. The idea of following nature in the treatment of diseases;—an idea which, I believe, prevails more and more in the practice of every physician, in proportion as his views are enlarged by science, is founded, not on hypothesis, but on one of the most general laws yet known with respect to the animal economy; and it implies an acknowledgment, not only of the vanity of abstract theories, but of the limited province of human art.*

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* Nov. Org. Lib. I. Aph. xcviii.

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* "Gaudet corpus vi prorsus mirabili, qua contra morbos se tueatur; multos arceat; multos jam inchoatos quam optime et citissime solvat; aliosque, suo modo, ad felicem exitum lentius perducat.

"Haec, *Autocrateia vis Naturae medicatrix* vocatur; medicis, philosophis, notissima, et jure celeberrima. Haec sola ad multos morbos sanandos sufficit, in omnibus fere prodest: Quin et medicamenta sua natura optima, tantum solummodo prosunt, quantum hujus vires insitas excitent, dirigant, gubernent. Medicina enim neque agit in cadaver, neque repugnante natura aliquid proficit."

Conspectus Medicinae Theoreticae. Auctore Jacobo Gregory, M. D. §§ 59, 60. (Edin. 1782.)†

† [The body happily possesses a power truly admirable, by means of which it protects itself against diseases. Many it repels; many already contracted it safely and speedily dissipates; and others, in its own way, it brings more slowly to a happy issue

This is called the *innate remedial power of nature:* by physicians and philosophers well known, and justly esteemed most admirable. Of itself it suffices to cure many diseases, and in almost all is beneficial. Moreover, medicines in their nature the most valuable, profit only as they excite, direct and regulate the power of this principle. For medicine neither acts upon the dead body, nor when nature is averse, can be of any benefit. *Gregory's* Conspectus Med. Theoret. Edin. 1782. sections 59 and 60.]

These slight remarks are sufficient to show, how vague and indeterminate the notion is, which is commonly annexed to the word *experience* by the most zealous advocates for its paramount authority in medicine. They seem farther to shew, that the question between them and their adversaries amounts to little more than a dispute about the comparative advantages of an experience guided by penetration and judgment, or of an experience which is to supersede all exercise of our rational faculties; of an experience accurate, various and discriminating, or of one which is gross and undistinguishing, like the perceptions of the lower animals.

Another department of knowledge in which constant appeals are made to *experience*, is the science of *politics;* and, in this science also, I apprehend, as well as in the former, that word is used with a far greater degree of latitude than is generally suspected. Indeed, most of the remarks which have been already offered on the one subject may be extended (*mutatis mutandis*) to the other. I shall confine my attention, therefore, in what follows, to one or two peculiarities by which politics is specifically and exclusively characterized as an object of study, and which seem to remove the species of evidence it admits of, to a still greater distance than that of *medicine* itself, from what the word *experience* naturally suggests to a careless inquirer.

The science of politics may be divided into two parts; the first having for its object the theory of government; the second, the general principles of legislation. That I may not lose myself in too wide a field, I shall, on the present occasion, wave all consideration of the former; and, for the sake of still greater precision, shall restrict my remarks to those branches of the latter, which are comprehended under the general title of *Political Economy;*—a phrase, however, which I wish to be here understood in its most extensive meaning.*

They who have turned their attention, during the last century, to inquiries connected with population, national wealth, and other collateral subjects, may be divided into two classes; to the one of which we may, for the sake of distinction, give the title of *political arithmeticians*, or *statistical collectors;* to the other, that of *political economists*, or *political philosophers*. The former are generally supposed to have the evidence of *experience* in their favour, and seldom fail to arrogate to themselves exclusively, the merit of treading closely in the footsteps of *Bacon*. In comparison with *them*, the latter are considered as little better than visionaries, or, at least, as entitled to no credit whatever, when their conclusions are at variance with the details of *statistics*.

In opposition to this prevailing prejudice it may, with confidence, be asserted, that, in so far as either of these branches of knowledge has any real value, it must rest on a basis of well-ascertained facts; and that the difference between them consists only in the different nature of the facts with which they are respectively conversant. The facts accumulated by the statistical collector are merely *particular results*, which other men have seldom an opportunity of verifying or of disproving; and which, to those who consider them in an insulated state, can never afford any important information. The facts, which the political philosopher professes to investigate, are exposed to the examination of all mankind; and while they enable him, like the general laws of physics, to ascertain numberless particulars by *synthetic reasoning*, they furnish the means of estimating the credibility of evidence resting on the testimony of individual observers.

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* See note (Z.)

It is acknowledged by Mr. Smith with respect to himself, that he had "no great faith in political arithmetic;"* and I agree with him so far as to think that little, if any, regard is due to a *particular phenomenon*, when stated as an objection to a conclusion resting on the *general laws* which regulate the course of human affairs. Even admitting the phenomenon in question to have been accurately observed, and faithfully described, it is yet possible that we may be imperfectly acquainted with that combination of circumstances whereby the effect is modified; and that, if these circumstances were fully before us, this apparent exception would turn out an additional illustration of the very truth which it was brought to invalidate.

If these observations be just, instead of appealing to political arithmetic as a check on the conclusions of political economy, it would often be more reasonable to have recourse to political economy as a check on the extravagancies of political arithmetic. Nor will this assertion appear paradoxical to those who consider, that the object of the political arithmetician is too frequently to record apparent exceptions to rules sanctioned by the general experience of mankind; and, consequently, that in cases where there is an obvious or a demonstrative incompatibility between the alleged exception and the general principle, the fair logical inference is not against the truth of the latter, but against the possibility of the former.

If has long been an established opinion among the most judicious and enlightened philosophers,—that *as the desire of bettering our condition appears equally from a careful review of the motives which habitually influence our own conduct, and from a general survey of the history of our species, to be the masterspring of human industry*, the labour of slaves never can be so productive as that of freemen. Not many years have elapsed, since it was customary to stigmatize this reasoning as visionary and metaphysical; and to oppose to it that species of evidence to which we were often reminded that all theories must bend;—the evidence of experimental calculations, furnished by intelligent and credible observers on the other side of the Atlantic. An accurate examination of the fact has shewn how wide of the truth these calculations were;—but independently of any such detection of their fallacy, might it not have been justly affirmed, that the argument from *experience* was decidedly against their credibility;—the facts, appealed to, resting solely upon the good sense and good faith of individual witnesses; while the opposite argument, drawn from the principles of the human frame, was supported by the united voice of all nations and ages?

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* Wealth of Nations, Vol. II. p. 310. 9th edit.

If we examine the leading principles which run through Mr. Smith's Inquiry into the Nature and Causes of the Wealth of Nations, we shall find, that all of them are general *facts* or general *results*, analogous to that which has been just mentioned. Of this kind, for instance, are the following propositions,—from which a very large proportion of his characteristical doctrines follow, as necessary and almost manifest corollaries: That what we call the Political Order, is much less the effect of human contrivance than is commonly imagined;—That every man is a better judge of his own interest than any legislator can be for him; and that this regard to private interest (or, in other words, this desire of bettering our condition) may be safely trusted to as a principle of action universal among men in its operation;—a principle stronger, indeed, in some than in others, but constant in its habitual influence upon all:—That, where the rights of individuals are completely protected by the magistrate, there is a strong tendency in human affairs, arising from what we are apt to consider as the selfish passions of our nature, to a progressive and rapid improvement in the state of society:—That this tendency to improvement in human affairs is often so very powerful, as to correct the inconveniences threatened by the errours of the statesman:—And that, therefore, the reasonable presumption is in favour of every measure which is calculated to afford to its farther development, a scope still freer than what it at present enjoys; or, which amounts very nearly to the same thing, in favour of as great a liberty in the employment of industry, of capital and of talents, as is consistent with the security of property, and of the other rights of our fellow-citizens.—The premises it is perfectly obvious, from which these conclusions are deduced, are neither hypothetical assumptions, nor metaphysical abstractions. They are practical maxims of good sense, approved by the experience of men in all ages of the world; and of which, if we wish for any additional confirmations, we have only to retire within our own bosoms, or to open our eyes on what is passing around us.

From these considerations it would appear, that in politics, as well as in many of the other sciences, the loudest advocates for experience are the least entitled to appeal to its authority in favour of their dogmas; and that the charge of a presumptuous confidence in human wisdom and foresight, which they are perpetually urging against political philosophers, may, with far greater justice, be retorted on themselves. An additional illustration of this is presented by the strikingly contrasted effects of *statistical* and of *philosophical* studies on the intellectual habits in general; the former invariably encouraging a predilection for restraints and checks, and all the other technical combinations of an antiquated and scholastic policy;—the latter, by inspiring, on the one hand, a distrust of the human powers, when they attempt to embrace in detail, interests at once so complicated and so momentous; and, on the other, a religious attention to the designs of Nature, as displayed in the general laws which regulate her economy;—leading, no less irresistibly, to a gradual and progressive simplification of the political mechanism. It is, indeed, the never failing result of all sound philosophy, to humble, more and more, the pride of science before that Wisdom which is infinite and divine;—whereas, the farther back we carry our researches into those age, the institutions of which have been credulously regarded as monuments of the superiority of unsophisticated good sense, over the false refinements of modern arrogance, we are the more struck with the numberless insults offered to the most obviour suggestions of nature and of reason. We may remark this, not only in the moral depravity of rude tribes, but in the universal disposition which they discover to disfigure and distort the bodies of their infants;—in one case, new-modelling the form ot the eyelids;—in a second, lengthening the ears;—in a third, checking the growth of the feet;—in a fourth, by mechanical pressures applied to the head, attacking the seat of thought and intelligence. To allow the human form to attain, in perfection its fair proportions, is one of the latest improvements of civilized society; and the case is perfectly analogous in those sciences which have for their object to assist nature in the cure of diseases; in the development and improvement of the intellectual faculties; in the correction of bad morals; and in the regulations of *political economy.*

SECTION VI.

OF THE SPECULATION CONCERNING FINAL CAUSES.

I.

Opinion of Lord Bacon on the subject.—Final Causes rejected by Des Cartes, and by the majority of French Philosophers.—Recognized as legitimate Objects of research by Newton.—Tacitly acknowledged by all as a useful logical guide, even in Sciences which have no immediate relation to Theology.

The study of Final Causes may be considered in two different points of view; first, as subservient to the evidences of natural religion; and secondly, as a guide and auxiliary in the investigation of physical laws. Of these views it is the latter alone which is immediately connected with the principles of the inductive logic; and it is to this, accordingly, that I shall chiefly direct my attention in the following observations. I shall not, however, adhere so scrupulously to a strict arrangement, as to avoid all reference to the former, where the train of my reflections may naturally lead to it. The truth is, that the two speculations will, on examination, be found much more nearly allied, than might at first sight be apprehended.

I before observed, that the phrase *Final Cause* was first introduced by Aristotle; and that the extension thus given to the notion of *causation* contributed powerfully to divert the inquiries of his followers from the proper objects of physical science. In reading the strictures of Bacon on this mode of philosophizing, it is necessary always to bear in mind, that they have a particular reference to the theories of the schoolmen; and, if they should sometimes appear to be expressed in terms too unqualified, due allowances ought to be made for the undistinguishing zeal of a reformer, in attacking prejudices consecrated by long and undisturbed prescription. "*Causarum finalium inquisitio sterilis est, et tanquam Virgo Deo consecrata, nihil parit.*" Had a similar remark occurred in any philosophical work of the eighteenth century, it might perhaps have been fairly suspected to savour of the school of Epicurus; although, even in such a case, the quaintness and levity of the conceit would probably have inclined a cautious and candid reader to interpret the author's meaning with an indulgent latitude. On the present occasion, however, Bacon is his own best commentator; and I shall therefore quote, in a faithful, though abridged translation, the preparatory passage by which this allusion is introduced.

"The second part of *metaphysics* is the investigation of *final causes;* which I object to, not as a speculation which ought to be "neglected, but as one which has, in general, been very improperly regarded as a branch of *physics.* If this were merely a fault "of arrangement, I should not be disposed to lay great stress upon "it; for arrangement is useful chiefly as a help to perspicuity, and "does not affect the substantial matter of science: But, in this "instance, a disregard of *method* has occasioned the most fatal consequences to philosophy; in as much as the consideration of *final* "causes in physics has supplanted and banished the study of *physical* "causes; the fancy amusing itself with illusory explanations derived from the former, and misleading the curiosity from a steady prosecution of the latter." After illustrating this remark by various examples, Bacon adds: "I would not, however, be understood, by "these observations, to insinuate, that the *final causes* just mentioned "may not be founded in truth, and, in a *metaphysical* view, extremely "worthy of attention; but only, that when such disquisitions invade "and overrun the appropriate province of *physics*, they are likely to lay waste and ruin that department of knowledge." The passage "concludes with these words: "And so much concerning *metaphysics;* the part of which relating to *final causes*, I do not deny, "has been often enlarged upon in physical, as well as in metaphysical treatises. But while, in the latter of these, it is treated of with "propriety, in the former, it is altogether misplaced; and *that*, not

" merely because it violates the rules of a logical order, but because " it operates as a powerful obstacle to the progress of inductive " science."*

The epigrammatic maxim which gave occasion to these extracts has, I believe, been oftener quoted (particularly by French writers) than any other sentence in Bacon's works ; and, as it has in general been stated, without any reference to the context, in the form of a detached aphorism, it has been commonly supposed to convey a meaning widely different from what appears to have been annexed to it by the author. The remarks with which he has prefaced it, and which I have here submitted to the consideration of my readers, sufficiently shew, not only that he meant his proposition to be restricted to the abuse of final causes in the physics of Aristotle, but that he was anxious to guard against the possibility of any misapprehension or misrepresentation of his opinion. A further proof of this is afforded by the censure which, in the same paragraph, he bestows on Aristotle, for " substituting Nature, instead of " God, as the fountain of final causes ; and for treating of them " rather as subservient to logic than to theology."

A similar observation may be made on another sentence in Bacon, in the interpretation of which a very learned writer, Dr. Cudworth, seems to have altogether lost sight of his usual candour. " Incre" dible est quantum agmen idolorum philosophiae immiserit natura" lium operationum ad similitudinem actionum humanarum reductio." " If (says Cudworth) the Advancer of Learning here speaks of those " who unskilfully attribute their own properties to inanimate bodies, " (as when they say, that matter *desires* forms as the female does " the male, and that heavy bodies descend down *by appetite* towards " the centre, that they may rest therein) there is nothing to be re" prehended in the passage. But, if his meaning be extended fur" ther to take away all final causes from the things of nature, then " is it the very spirit of atheism and infidelity. It is no *idol of the* " *cave or den* (to use that affected language) that is, no prejudice or " fallacy imposed on ourselves, from the attributing our own ani" malish properties to things without us, to think that the frame " and system of this whole world was contrived by a perfect under" standing and mind."

It is difficult to conceive that any person who had read Bacon's works, and who, at the same time, was acquainted with the theories which it was their great object to explode, could, for a moment, have hesitated about rejecting the latter interpretation as altogether absurd; and yet the splenetic tone which marks the conclusion of Cudworth's strictures, plainly shews, that he had a decided leaning to it, in preference to the former.† The comment does no honour to his liberality; and, on the most favourable supposition, must be imputed to a superstitious reverence for the remains of Grecian wisdom, accompanied with a corresponding dread of the unknown dangers to be apprehended from philosophical innovations. Little was he aware, that, in turning the attention of men from the history of opinions and systems to the observation and study of nature, Bacon was laying the foundation of a bulwark against atheism, more stable and impregnable than the united labours of the ancients were able to rear;—a bulwark which derives additional strength from every new accession to the stock of human knowledge.*

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* De Augm. Scient. Lib. III. cap. iv. v. See note (AA.)

† Even the *former* interpretation is not agreeable (as appears manifestly from the context) to Bacon's idea. The prejudices which he has here more particularly in view, are those

Whether Bacon's contempt for the Final Causes of the Aristotelians has not carried him to an extreme in recommending the *total* exclusion of them from physics, is a very different question; and a question of much importance in the theory of the inductive logic. My own opinion is, that his views on this point, if considered as applicable to the *present* state of experimental science, are extremely limited and erroneous. Perhaps, at the time when he wrote, such an exclusion may have appeared necessary, as the only effectual antidote against the errors which then infected every branch of philosophy; but, granting this to be true, no good reason can be given for continuing the same language, at a period, when the proper object of physics is

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which take their rise from a bias in the mind to imagine a greater *equality* and *uniformity* in nature than really exists. As an instance of this, he mentions the universal assumption among the ancient astronomers, that all the celestial motions are performed in orbits perfectly circular;—an assumption, which, a few years before Bacon wrote, had been completely disproved by Kepler. To this he adds some other examples from physics and chemistry; after which he introduces the general reflection animadverted on by Cudworth.—The whole passage concludes with these words. "Tanta est harmoniae discrepantia inter spiritum hominis et spiritum mundi"

The criticism may appear minute; but I cannot forbear to mention, as a proof of the carelessness with which Cudworth had read Bacon, that the prejudice supposed by the former to belong to the class of *idola specus*, is expressly quoted by the latter, as an example of the *idola tribus*. (See the 5th Book de Augment. Scient. Cap. iv.)

* Extabit eximium Newtoni opus adversus Atheorum impetus munitissimum praesidium. (Cotesii Praef. in Edit. Secund. Princip.)

In the above vindication of Bacon, I have abstained from any appeal to the instances in which he has himself forcibly and eloquently expressed the same sentiments here ascribed to him; because I conceive that an author's real opinions are to be most indisputably judged of from the *general* spirit and tendency of his writings. The following passage, however, is too precious a document to be omitted on the present occasion. It is indeed one of the most hackneyed quotations in our language; but it forms, on that very account, the more striking a contrast to the voluminous and now neglected erudition displayed by Cudworth in defence of the same argument.

"I had rather believe all the fables in the Legend, and the Talmud, and the Alcoran, than that this universal frame is without a mind! It is true that a little philosophy inclineth man's mind to atheism; but depth in philosophy bringeth men's minds about to religion; for while the mind of man looketh upon second causes scattered, it may sometimes rest in them and go no farther; but when it beholdeth the chain of them confederate and linked together, it must needs fly to providence and Deity: nay, even that school which is most accused of atheism, doth most demonstrate religion; that is, the school of Leucippus, and Democritus, and Epicurus: for it is a thousand times more credible, that four mutable elements and one immutable fifth essence, duly and eternally placed, need no God, than that an army of infinite small portions, or seeds unplaced, should have produced this order and beauty without a divine marshal." (Bacon's Essays.)

too well understood, to render it possible for the investigation of final causes to lead astray the most fanciful theorist. What harm can be apprehended from remarking those proofs of design which fall under the view of the physical inquirer in the course of his studies? Or, if it should be thought foreign to *his* province to speak of *design*, he may, at least, be permitted to remark what *ends* are really accomplished by particular *means*; and what *advantages* result from the general laws by which the phenomena of nature are regulated. In doing this, he only states *a fact*; and if it be illogical to go farther, he may leave the inference to the moralist or the divine.

In consequence, however, of the vague and commonplace declamation against final causes, sanctioned (as has been absurdly supposed) by those detached expressions of Bacon, which have suggested the foregoing reflections, it has, for many years past, become fashionable to omit the consideration of them entirely, as inconsistent with the acknowledged rules of sound philosophizing;—a caution (it may be remarked by the way) which is most scrupulously observed by those writers who are the most forward to censure every apparent *anomaly* or *disorder* in the economy of the universe. The effect of this has been, to divest the study of nature of its most attractive charms; and to sacrifice to a false idea of logical rigour, all the moral impressions and pleasures which physical knowledge is fitted to yield.*

Nor is it merely in a *moral view*, that the consideration of *uses* is interesting. There are some parts of nature in which it is necessary to complete the *physical theory*; nay there are instances, in which it has proved a powerful and perhaps indispensable organ of *physical discovery*. That Bacon should not have been aware of this, will not appear surprising, when it is recollected, that the chief facts which justify the observation have been brought to light since his time.

Of these *facts*, the most remarkable are furnished by the science of anatomy. To understand the structure of an animal body, it is necessary not only to examine the *conformation* of the parts, but to consider their *functions*; or, in other words, to consider their *ends* and *uses*: Nor, indeed, does the most accurate knowledge of the former, till perfected by the discovery of the latter, afford satisfaction to an inquisitive and scientific mind. Every anatomist, accordingly, whatever his metaphysical creed may be, proceeds, in his researches, upon the maxim, that no organ exists without its appropriate destination; and although he may often fail in his attempts to ascertain what this destination is, he never carries his scepticism so far, as, for a moment, to doubt of the general principle. I am inclined to think, that it is in this way the most important steps in physiology have been gained; the curiosity being constantly kept alive by some new problem in the animal machine; and, at the same time, checked in its wanderings, by an irresistible conviction, that nothing is made in vain. The memorable account given by Mr. Boyle of the circumstances which led to the discovery of the circulation of the blood, is but one of the many testimonies which might be quoted in confirmation of this opinion.

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* "If a traveller (says the great Mr. Boyle) being in some ill-inhabited eastern country, should come to a large and fair building, such as one of the most stately of those they call caravanzeras, though he would esteem and be delighted with the magnificence of the structure, and the commodiousness of the apartments, yet supposing it to have been erected but for the honour or the pleasure of the founder, he would commend so stately a fabric, without thanking him for it; but, if he were satisfied that this commodious building was designed by the founder as a receptacle for passengers, who were freely to have the use of the many conveniences the apartments afforded, he would then think himself obliged, not only to praise the magnificence, but with gratitude to acknowledge the bounty and the philanthropy of so munificent a benefactor." (Boyle's Works, Vol. IV. p. 517. Folio edition.)

" I remember that when I asked our famous Harvey, in the only " discourse I had with him (which was but a little while before he " died) what were the things which induced him to think of a circulation of the blood? he answered me, that when he took notice, " that the valves in the veins of so many parts of the body were " so placed, that they gave free passage to the blood towards the " heart, but opposed the passage of the venal blood the contrary " way, he was invited to think, that so provident a cause as nature " had not placed so many valves without design; and no design " seemed more probable, than that, since the blood could not well, " because of the interposing valves, be sent by the veins to the " limbs, it should be sent through the arteries, and return through " the veins, whose valves did not oppose its course that way."*

This perception of design and contrivance is more peculiarly impressive, when we contemplate those instances in the animal economy, in which the same effect is produced in *different* combinations of circumstances, by *different* means;—when we compare, for example, the circulation of the blood in the foetus, with that in the body of the animal after it is born. On such an occasion, how is it possible to withhold the assent from the ingenious reflection of Baxter! " Art and means are designedly multiplied, that we might

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* Boyle's Works, Vol. IV. p. 539. Folio ed. See Outlines of Moral Philosophy, p. 185. (Edin. 1793.)

The reasoning here ascribed to Harvey seems now so very natural and obvious, that some have been disposed to question his claim to the high rank commonly assigned to him among the improvers of science. The late Dr. William Hunter has said, that after the discovery of the valves in the veins, which Harvey learned, while in Italy, from his master Fabricius ab Aquapendente, the remaining step might easily have been made by any person of common abilities. "This discovery (he observes) set Harvey to work upon the use of the heart and vascular system in animals, and, in the course of some years, he was so happy as to discover, and to prove beyond all possibility of doubt, the circulation of the blood." He afterwards expresses his astonishment that this discovery should have been left for Harvey; adding, that " Providence meant to reserve it for *him*, and would not let men *see what was before them, nor understand what they read*." (Hunter's Introductory Lectures, p. 42. et seq.)

Whatever opinion be formed on this point, Dr. Hunter's remarks are valuable, as an additional proof of the regard paid by anatomists to *Final Causes*, in the study of physiology.

See also Haller, Elem. Physiolog. Tom. I. p. 204.

"not take it for the effects of chance; and, in some cases, the "method itself is different, that we might see it is not the effect of "surd necessity."[*]

The study of comparative anatomy leads, at every step, so directly and so manifestly to the same conclusion, that even those physiologists who had nothing in view but the advancement of their own science, unanimously agree in recommending the dissection of animals of different kinds, as the most effectual of all helps for ascertaining the *functions* of the various organs in the human frame; —tacitly assuming, as an incontrovertible truth, that, in proportion to the variety of means by which the same effect is accomplished, the presumption increases, that this effect was an *end* in the contemplation of the artist. "The intention of nature (says one author) "in the formation of the different parts, can no where be so well "learned as from comparative anatomy; that is, if we would under"stand physiology, and reason on the functions of the animal econo"my, we must see how the same end is brought about in other "species.—We must contemplate the part or organ in *different* "animals; its shape, position, and connexion with the other parts;

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[*] Inquiry into the Nature of the Human Soul, Vol. I. p. 136. (3d ed.)

The following passage from an old English divine may be of use for the farther illustration of this argument. I quote it with the greater confidence, as I find that the most eminent and original physiologist of the present age (M. Cuvier) has been led, by his enlightened researches concerning the laws of the animal economy, into a train of thinking strikingly similar.

"Man is always mending and altering his works; but nature observes not the same tenor, because her works are so perfect, that there is no place for amendments, nothing that can be reprehended. The most sagacious men in so many ages, have not been able to find any flaw in these divinely contrived and formed machines; no blot or error in this great volume of the world, as if any thing had been an imperfect essay at the first; nothing that can be altered for the better; nothing but if it were altered would be marred. This could not have been, had man's body been the work of chance, and not counsel and providence. Why should there be constantly the same parts? Why should they retain constantly the same places? Nothing so contrary as constancy and chance. Should I see a man throw the same number a thousand times together upon but three dice, could you persuade me that this were accidental, and that there was no necessary cause for it? How much more incredible then is it, that constancy in such a variety, such a multiplicity of parts, should be the result of chance? Neither yet can these works be the effects of Necessity or Fate, for then there would be the same constancy observed in the *smaller* as well as in the larger parts and vessels; whereas *there* we see nature doth, as it were, sport itself, the minute ramifications of all the vessels, veins, arteries, and nerves, infinitely varying in individuals of the same species, so that they are not in any two alike." (Ray's Wisdom of God in the Creation.)

"Nature, (says Cuvier) while confining herself strictly within those limits, which the conditions necessary for existence prescribed to her, has yielded to her spontaneous fecundity wherever these conditions did not limit her operations; and without ever passing beyond the small number of combinations, that can be realized in the essential modifications of the important organs, she seems to have given full scope to her fancy in filling up the subordinate parts. With respect to these, it is not inquired, whether an individual form, whether a particular arrangement be necessary; it seems often not to have been asked, whether it be even useful, in order to reduce it to practice; it is sufficient that it be possible, that it destroy not the harmony of the whole. Accordingly, as we recede from the principal organs, and approach to those of less importance, the varieties in structure and appearance become more numerous; and when we arrive at the surface of the body, where the parts the least essential, and whose injuries are the least momentous, are necessarily placed, the number of varieties is so great, that the conjoined labours of naturalists have not yet been able to give us an adequate idea of them." (Leçons d'Anatomie Comparée.)

"and observe what thence arises. If we find ONE COMMON EFFECT "constantly produced, though in a very different way, we may "safely conclude that this is the *use* or *function* of the part.—This "reasoning can never betray us, if we are but sure of the facts."[*]

The celebrated Albinus expresses himself to the same purpose in his preface to Harvey's *Exercitatio de Motu Cordis.* "(1) Incidenda "autem animalia, quibus partes illae quarum actiones quaerimus "eaedem atque homini sunt, aut certe similes iis; ex quibus sine "metu erroris judicare de illis hominis liceat. Quin et reliqua, si "modo aliquam habeant ad hominem similitudinem, idonea sunt ad "aliquod suppeditandum."

If Bacon had lived to read such testimonies as these in favour of the investigation of Final Causes; or had witnessed the discoveries to which it has led in the study of the animal economy, he would, I doubt not, have readily admitted, that it was not altogether uninteresting and unprofitable, even to the *physical* inquirer. Such, however, is the influence of an illustrious name, that, in direct opposition to the evidence of historical facts, the assertion of the complete *sterility* of all these speculations is, to the present day, repeated, with undiminished confidence, by writers of unquestionable learning and talents. In one of the most noted physiological works which have lately appeared on the continent, Bacon's apothegm is cited more than once with unqualified approbation; although the author candidly owns, that it is difficult for the most *reserved* philosopher always to keep it steadily in view, in the course of his inquiries.[†]

The prejudice against final causes, so generally avowed by the most eminent philosophers of France, during the eighteenth century, was first introduced into that country by Des Cartes. It must not, however, be imagined, that, in the mind of this great man, it arose from any bias towards atheism. On the contrary, he himself tells us, that his objection to the research of *uses* or *ends*, was founded entirely on the presumptuous confidence which it seemed to argue in the powers of human reason; as if it were conceivable, that the limited faculties of man could penetrate into the counsels of Divine wisdom. Of the existence of God he conceived that a demonstrative proof was afforded by the idea we are able to form of a Being infinitely perfect, and necessarily existing; and it has with some

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[*] Letter by an anonymous Correspondent, prefixed to Monro's *Comparative Anatomy*, London, 1744.

[†] "Je regarde, avec le grand Bacon, la philosophie des causes finales comme stérile: mais il est bien difficile à l'homme le plus réservé, de n'y avoir jamais recours dans ses explications." (Rapports du Physique et du Moral de l'Homme. Par M. le Sénateur Cabanis. Tome I. p. 352. Paris, 1805.)

[With the great Bacon, I regard the philosophy of final causes as useless; but it is difficult for the most careful philosopher to avoid having occasional recourse to it.]

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(1) [Such animals should be dissected, whose parts, the actions of which we seek, are the same with those of man, or at least resemble his; from these we may without fear of error judge of those which belong to man. And also the parts of other animals, if they have any resemblance whatever to man, may not be without their use.]

probability been conjectured, that it was his partiality to this new argument of his own, which led him to reject the reasonings of his predecessors in support of the same conclusion.[*]

To this objection of Des Cartes, an elaborate, and, in my opinion, a most satisfactory reply, is to be found in the works of Mr. Boyle. The principal scope of his essay may be collected from the following short extract.

"Suppose that a countryman, being in a clear day brought into "the garden of some famous mathematician, should see there one "of those curious gnomonic instruments, that shew at once the place "of the sun in the zodiac, his declination from the equator, the day "of the month, the length of the day, &c. &c. It would indeed be "presumption in him, being unacquainted both with the mathematical disciplines, and the several intentions of the artist to pretend "or think himself able to discover *all the ends* for which so curious "and elaborate a piece was framed: but when he sees it furnished "with a style, with horary lines and numbers, and in short with all "the requisites of a sun-dial, and manifestly perceives the shadow "to mark from time to time the hour of the day, it would be no "more a presumption than an errour in him to conclude, that "(whatever other uses the instrument was fit or was designed for) "it is a sun-dial, that was meant to shew the hour of the day."[†]

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[*] "Nullas unquam rationes circa res naturales *a fine*, quam Deus aut natura in iis faciendis sibi proposuit, desumemus; quia non tantum debemus nobis arrogare ut ejus consiliorum participes nos esse putemus." (Princip. Pars. I. § 28.) "Dum haec perpendo attentius, occurrit primò non mihi esse mirandum si quaedam a Deo fiant quorum rationes non intelligam; nec de ejus existentia ideo esse dubitandum, quod forte quaedam alia esse experiar quae, quare, vel quomodo ab illo facta sint non comprehendo; cum enim jam sciam naturam meam esse valde infirmam et limitatam, Dei autem naturam esse immensam, incomprehensibilem, infinitam, ex hoc satis etiam scio innumerabilia illum posse, quorum causas ignorem; *atque ob hanc unicam rationem totum illud causarum genus, quod a fine peti solet in rebus physicis, nullum usum habere existimo;* non enim absque temeritate me puto posse investigare fines Dei." (Meditatio Quarta.)

See note (BB.)

[We shall assume no reasonings concerning natural things from the *ends* which God hath proposed to himself in their creation, because we ought not to arrogate to ourselves the dignity of being partakers of his counsels . . . . In my meditations on this subject, the first consideration which occurs, is this; that it is no cause of surprize God hath created many things, of whose uses I am ignorant; and that it affords no ground for doubting his existence should I discover there are many other things of which I can comprehend neither the reason nor the manner of their creation: since I plainly see that my own nature is very feeble and limited, while that of God is immense, incomprehensible, infinite. This consideration alone is sufficient to persuade me, that innumerable things are possible with Him, of whose uses I must be ignorant. *For this one reason, therefore, I am of opinion, that the whole kind of causes, which in physics are usually deduced from the* ENDS *proposed, are altogether useless.* For I am sensible, that I cannot without rashness, pretend to fathom the purposes of God.] *Fourth Meditation.*

[†] In the same essay, Mr. Boyle has offered some very judicious strictures on the abuses to which the research of final causes is liable, when incautiously and presumptuously pursued. An abstract of these, accompanied with a few illustrations from later writers, might form an interesting chapter in a treatise of inductive logic.

The subject has been since prosecuted with considerable ingenuity by Le Sage of Geneva, who has even attempted (and not altogether without success) to lay down logical rules for the investigation of *ends*. To this study, which he was anxious to form into a separate science, he gave the very ill chosen name of *Teleologie;* a name, if I am not mistaken, first suggested by Wolfius.—For some valuable fragments of his intended work with re-

With this opinion of Boyle that of Newton so entirely coincided, that (according to Maclaurin) he thought the consideration of final causes *essential* to true philosophy; and was accustomed to congratulate himself on the effect of his writings in reviving an attention to them, after the attempt of Des Cartes to discard them from physics. On this occasion, Maclaurin has remarked, " that, of all sort of causes, final causes are the most clearly placed in our view;—and that " it is difficult to comprehend, why it should be thought arrogant to " attend to the design and contrivance that is so evidently displayed in " nature, and obvious to all men;—to maintain for instance, that the " eye was made for seeing though we may not be able either to account mechanically for the refraction of light in its coats, or to explain how the image is propagated from the retina to the mind."* —It is Newton's own language, however, which alone can do justice to his sentiments on the present subject.

" The main business of natural philosophy is to argue from phenomena, without feigning hypotheses, and to deduce causes from " effects till we come to the very first cause, which certainly is not " mechanical; and not only to unfold the mechanism of the world, " but chiefly to resolve these and such like questions: *Whence is it* " *that Nature does nothing in vain; and whence arises all that order* " *and beauty which we see in the world?—How came the bodies of animals to be contrived with so much art, and for what ends were their* " *several parts? Was the eye contrived without skill in optics, and the* " *ear without knowledge of sounds?*"†

In multiplying these quotations, I am well aware that authorities are not arguments; but when a prejudice, to which authority alone has given currency, is to be combated, what other refutation is likely to be effectual?

After all, it were to be wished that the scholastic phrase *final cause* could, without affectation, be dropped from our philosophical vocabulary; and some more unexceptionable mode of speaking substituted instead of it. In this elementary work, I have not presumed to lay aside entirely a form of expression consecrated in the writings of Newton, and of his most eminent followers; but I am fully sensible of its impropriety, and am not without hopes that I may contribute something to encourage the gradual disuse of it, by the indiscriminate employment of the words *ends* and *uses* to convey the same idea. Little more perhaps than the general adoption of one or other of these terms is necessary, to bring candid and reflecting minds to a uniformity of language as well as of sentiment on the point in question.

It was before observed, with respect to anatomists, that all of them without exception, whether professedly friendly or hostile to

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spect to it, see the Account of his Life and Writings by his friend M. Prevost. (Geneva, 1805.)

* Account of Newton's Philosophical Discoveries, Book I. Chap. ii.

† Newton's Optics, Query 28.

the inquisition of final causes, concur in availing themselves of its guidance in their physiological researches. A similar remark will be found to apply to other classes of scientific inquirers. Whatever their speculative opinions may be, the moment their curiosity is fairly engaged in the pursuit of truth, either physical or moral, they involuntarily, and often perhaps unconsciously, submit their understandings to a logic borrowed neither from the schools of Aristotle nor of Bacon. The ethical system (for example) of those ancient philosophers who held that Virtue consists in following Nature, not only involves a recognition of final causes, but represents the study of them, in as far as regards the ends and destination of our own being, as the great business and duty of life.[*] The system too of those physicians who profess to follow Nature in the treatment of diseases, by watching and aiding her medicative powers, assumes the same doctrine as its fundamental principle. A still more remarkable illustration, however, of the influence which this species of evidence has over the belief, even when we are the least aware of its connection with metaphysical conclusions, occurs in the history of the French Economical System. Of the comprehensive and elevated views which at first suggested it, the title of *Physiocratie*, by which it was early distinguished, affords a strong presumptive proof; and the same thing is more fully demonstrated, by the frequent recurrence made in it to the physical and moral laws of Nature, as the unerring standard which the legislator should keep in view in all his positive institutions.[†] I do not speak at present of the justness of these opinions. I wish only to remark, that, in the statement of them given by their original authors, it is taken for granted as a truth self-evident and indisputable, not merely that benevolent design is manifested in all the physical and moral arrangements connected with this globe, but that the study of these arrangements is indispensably necessary to lay a solid foundation for political science.

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[*] "Discite, O miseri, et causas cognoscite rerum,
Quid sumus, et quidnam victuri gignimur "[‡] *Persius.*

Εγω δε τι βουλομαι· καταμαθειν την φυσιν, και ταυτη επεσθαι.[§] *Epictet.*

[†] "Ces lois forment ensemble ce qu'on appelle *la loi naturelle.* Tous les hommes et toutes les puissances humaines doivent être soumis à ces lois souveraines, instituées par l'être supreme: elles sont immutables et irréfragables, et les meilleurs loix possibles; et par conséquent, la base du gouvernement le plus parfait, et la régle fondamentale de toutes les loix positives; car les loix positives ne sont que des loix de manutention relatives à l'ordre naturel evidemment le plus avantageux au genre humain."[||]—*Quesnay.*

[‡] [Contemplate well this theatre of Man;
Observe the drama and its moral plan;
Study of things the causes and the ends:
Whence is our being, and to what it tends.]
Persius III. 66.

[§] [To study nature, and to follow the path which she points out, is the object I seek.]

[||] [These laws form together what we call *natural law.* All men and all human powers must submit to these sovereign laws, instituted by the supreme being: they are immutable and irrefragable, and the best laws possible, and consequently the basis of the most perfect government, and the fundamental rule of all positive laws: for positive laws are only laws of preservation relative to the natural order, which is evidently the most advantageous to the human race.]

The same principles appear to have led Mr. Smith into that train of thinking which gave birth to his inquiries concerning National Wealth. "Man (he observes in one of his oldest manuscripts "now extant) is generally considered by statesmen and projectors "as the materials of a sort of political mechanics. Projectors disturb Nature in the course of her operations in human affairs; and "it requires no more than to let her alone, and give her fair play in "the pursuit of her own designs."—And in another passage: "Little "else is requisite to carry a state to the highest degree of opulence "from the lowest barbarism, but peace, easy taxes, and a tolerable "administration of justice; all the rest being brought about by the "natural course of things. All governments which thwart this natural course; which force things into another channel; or which "endeavour to arrest the progress of society at a particular point, "are unnatural, and to support themselves are obliged to be oppressive and tyrannical."* Various other passages of a similar import might be quoted, both from his Wealth of Nations, and from his Theory of Moral Sentiments.

This doctrine of Smith and Quesnay, which tends to simplify the theory of legislation, by exploding the policy of those complicated checks and restraints which swell the municipal codes of most nations, has now, I believe, become the prevailing creed of thinking men all over Europe; and, as commonly happens to prevailing creeds, has been pushed by many of its partisans far beyond the views and intentions of its original authors. Such too is the effect of fashion, on the one hand, and of obnoxious phrases on the other, that it has found some of its most zealous abettors and propagators among writers who would, without a moment's hesitation, have rejected, as puerile and superstitious, any reference to *final causes* in a philosophical discussion.

II.

Danger of confounding Final with Physical Causes in the Philosophy of the Human Mind.

Having said so much upon the research of Final causes in *Physics, properly so called*, I shall subjoin a few remarks on its application to the philosophy of the human mind;—a science in which the just rules of investigation are as yet far from being generally understood. Of this no stronger proof can be produced, than the confusion between final and efficient causes, which perpetually recurs in the writings of our latest and most eminent moralists. The same confusion, as I have already observed, prevailed in the *physical* reasonings of the Aristotelians; but, since the time of Bacon, has been so completely corrected, that, in the wildest theories of modern naturalists, hardly a vestige of it is to be traced.

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* Biographical Memoirs of Smith, Robertson, and Reid, p. 100.

To the logical errour just mentioned it is owing, that so many false accounts have been given of the principles of human conduct, or of the motives by which men are stimulated to action. When the general laws of our internal frame are attentively examined, they will be found to have for their object the happiness and improvement both of the individual and of society. This is their Final Cause, or the end for which we may presume they were destined by our Maker. But, in such cases, it seldom happens, that while man is obeying the *active impulses* of his nature, he has any idea of the ultimate ends which he is promoting; or is able to calculate the remote effects of the movements which he impresses on the little wheels around him. These *active impulses*, therefore, may, in one sense, be considered as the *efficient causes* of his conduct; in as much as they are the means employed to determine him to particular pursuits and habits; and as they operate (in the *first* instance, at least,) without any reflection on his part on the purposes to which they are subservient. Philosophers, however, have in every age been extremely apt to conclude, when they had discovered the salutary tendency of any active principle, that it was from a sense or foreknowledge of this tendency that the principle derived its origin. Hence have arisen the theories which attempt to account for all our actions from self-love; and also those which would resolve the whole of morality, either into political views of general expediency, or into an enlightened regard to our own best interests.

I do not know of any author who has been so completely aware of this common errour as Mr. Smith. In examining the principles connected with our moral constitution, he always treats separately of their *final causes*, and of the *mechanism* (as he calls it) by which nature accomplishes the effect; and he has even been at pains to point out to his successors the great importance of attending to the distinction between these two speculations—"In every part of the universe, we observe means adjusted with the nicest artifice to the ends which they are intended to produce; and in the mechanism of a plant or animal body, admire how every thing is contrived for advancing the two great purposes of nature, the support of the individual, and the propagation of the species. But in these, and in all such objects, we still distinguish the efficient from the final cause of their several motions and organizations. The digestion of the food, the circulation of the blood, and the secretion of the several juices which are drawn from it, are operations all of them necessary for the great purposes of animal life; yet we never endeavour to account for them from those purposes as from their efficient cause, nor imagine that the blood circulates, or the food digests of its own accord, and with a view or intention to the purposes of circulation or digestion. The wheels of the watch are all admirably adapted to the end for which it was made.

"the pointing of the hour. All their various motions conspire in the nicest manner to produce this effect. If they were endowed with a desire and intention to produce it, they could not do it better. Yet we never ascribe any such intention or desire to them, but to the watch-maker, and we know that they are put into motion by a spring, which intends the effect it produces as little as they do. But though, in accounting for the operations of bodies, we never fail to distinguish, in this manner, the efficient from the final cause, in accounting for those of the mind, we are apt to confound these two different things with one another. When, by natural principles, we are led to advance those ends which a refined and enlightened reason would recommend to us, we are very apt to impute to that reason, as to their efficient cause, the sentiments and actions by which we advance those ends, and to imagine that to be the wisdom of Man, which, in reality, is the wisdom of God. Upon a superficial view, this cause seems sufficient to produce the effects which are ascribed to it; and the system of Human Nature seems to be more simple and agreeable, when all its different operations are, in this manner, deduced from a single principle."*

These remarks apply with peculiar force to a theory of morals which has made much noise in our own times;—a theory which resolves the obligation of all the different virtues into a sense of their *utility*. At the time when Mr. Smith wrote, it had been recently brought into fashion by the ingenious and refined disquisitions of Mr. Hume; and there can be little doubt, that the foregoing strictures were meant by the author as an indirect refutation of his friend's doctrines.

The same theory (which is of a very ancient date)† has been since revived by Mr. Godwin, and by the late excellent Dr. Paley. Widely as these two writers differ in the *source* whence they derive their rule of conduct, and the *sanctions* by which they enforce its observance, they are perfectly agreed about its paramount authority over every other principle of action. "Whatever is *expedient* (says Dr. Paley) is *right*. It is the utility of any moral rule alone which constitutes the obligation of it.‡ . . . But then, it must be expedient *on the whole*, at the long run, in all its effects collateral and remote, as well as those which are immediate and direct; as it is obvious, that, in computing consequences, it makes no difference in what way, or at what distance they ensue."§—Mr. Godwin has no where expressed himself, on this fundamental question of practical ethics, in terms more decided and unqualified.

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* Theory of Moral Sentiments, Vol. I. p. 216, et seq. 6th edit.

† "Ipsa utilitas, justi prope mater et aequi."‖ *Horat.* Sat. Lib. I. 3.

‡ Principles of Moral and Political Philosophy, Vol. I. p. 70. (5th edit.) [Paley's Works, vol. iii. p. 70. Boston edit.]

§ Ibid. p. 78. (Boston edit. p. 75)
In another part of his work, Dr. Paley explicitly asserts, that *every* moral rule is liable

‖ [Sense, custom, social good, from whence arise
All forms of right and wrong.]

The observations quoted from Mr. Smith on the proneness of the mind, in moral speculations, to confound together efficient and final causes, furnish a key to the chief difficulty, by which the patrons of this specious but very dangerous system have been misled.

Among the qualities connected with the different virtues, there is none more striking than their beneficial influence on social happiness; and accordingly, moralists of all descriptions, when employed in enforcing particular duties, such as justice, veracity, temperance, and the various charities of private life, never fail to enlarge on the numerous blessings which follow in their train. The same observation may be applied to *self-interest;* in as much, as the most effectual way of promoting it is universally acknowledged to be by a strict and habitual regard to the obligations of morality.—In consequence of this *unity of design*, which is not less conspicuous in the moral than in the natural world, it is easy for a philosopher to give a plausible explanation of all our duties from *one* principle; because the general tendency of all of them is to determine us to the same course of life. It does not, however, follow from this, that it is from such a comprehensive survey of the consequences of human conduct, that our ideas of right and wrong are derived; or that we are entitled, in particular cases, to form rules of action to ourselves, drawn from speculative conclusions concerning the *final causes* of our moral constitution. If it be true (as some theologians have presumed to assert) that benevolence is the sole principle of action in the Deity, we must suppose that the duties of veracity and justice were enjoined by Him. *not* on account of their intrinsic rectitude, but of their utility: but still, with respect to man, these are sacred and indispensable laws—laws which he never transgresses, without incurring the penalties of self-condemnation and remorse: And indeed if, without the guidance of any internal monitor, he were left to infer the duties incumbent on him from a calculation and comparison of remote effects, we may venture to affirm, that there would not be enough of virtue left in the world to hold society together.

To those who have been accustomed to reflect on the general analogy of the human constitution, and on the admirable adaptation of its various parts to that scene in which we are destined to act, this last consideration will, independently of any examination of the fact, suggest a very strong presumption *a priori* against the doc-

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to be superseded in particular cases on the ground of expediency. "Moral philosophy cannot pronounce that any rule of morality is so rigid as to bend to no exceptions; nor, on the other hand, can she comprise these exceptions within any previous description. She confesses, that the obligation of every law depends upon its ultimate utility; that this utility, having a finite and determinate value. situations may be feigned, and consequently may possibly arise, in which the general tendency is outweighed by the enormity of the particular mischief; and of course, where ultimate utility renders it as much an act of duty to break the rule, as it is on other occasions to observe it." Vol. ii. p. 411. (Vol. iii, p. 509. Boston edit.)

trine to which the foregoing remarks relate. For it is at all consonant with the other arrangements so wisely calculated for human happiness to suppose, that the conduct of such a fallible and short-sighted creature as Man would be left to be regulated by no other principle than the private opinion of each individual concerning the *expediency* of his own actions? or, in other words, by the conjectures which he might form on the good or evil resulting *on the whole* from an endless train of future contingencies? Were this the case, the opinions of mankind with respect to the rules of morality would be as various, as their judgments about the probable issue of the most doubtful and difficult determinations in politics. Numberless cases might be fancied, in which a person would not only *claim* merit but actually *possess* it, in consequence of actions which are generally regarded with indignation and abhorrence;—for unless we admit such duties as justice, veracity, and gratitude, to be immediately and imperatively sanctioned by the authority of reason and of conscience, it follows as a necessary inference, that we are *bound* to violate them, when ever, by doing so, we have a prospect of advancing any of the essential interests of society; or (which amounts to the same thing) that a good *end* is sufficient to sanctify whatever *means* may appear to us to be necessary for its accomplishment. Even men of the soundest and most penetrating understandings might frequently be led to the perpetration of enormities, if they had no other light to guide them but what they derived from their own uncertain anticipations of futurity. And when we consider how small the number of such men is, in comparison of those whose judgments are perverted by the prejudices of education and their own selfish passions, it is easy to see what a scene of anarchy the world would become. Of this indeed we have too melancholy an experimental proof, in the history of those individuals who have in practice adopted the rule of *general expediency* as their whole code of morality;—a rule which the most execrable scourges of the human race have, in all ages, professed to follow, and of which they have uniformly availed themselves, as an apology for their deviations from the ordinary maxims of right and wrong.

Fortunately for mankind, the peace of society is not thus entrusted to accident, the great rules of a virtuous conduct being confessedly of such a nature as to be obvious to every sincere and well-disposed mind. And it is in a peculiar degree striking, that, while the *theory* of ethics involves some of the most abstruse questions which have ever employed the human faculties, the moral judgments and moral feelings of the most distant ages and nations, with respect to all the most essential duties of life, are one and the same.[*]

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[*] "Si quid rectissimum sit, quærimus; perspicuum est. Si quid maximè expediat; obscurum Sin ii sumus, qui profectò esse debemus, ut nihil arbitremur expedire, nisi quod rectum honestumque sit; non potest esse dubium, quid faciendum nobis sit."[‡]—*Cic. Ep. ad Fam.* iv. 2.

[‡] [If we seek what is right, our way is clear; if what is expedient, it is not clear. But if our character be such as it ought to be, and we think that nothing is expedient, but what is right and just; we can have no doubt what ought to be our course of practice.]

Of this theory of utility, so strongly recommended to some by the powerful genius of Hume, and to others by the well-merited popularity of Paley, the most satisfactory of all refutations is to be found in the work of Mr. Godwin. It is unnecessary to inquire how far the practical lessons he has inculcated are logically inferred from his fundamental principle; for although I apprehend much might be objected to these, even on his own hypothesis, yet, *if* such be the conclusions to which, in the judgment of so acute a reasoner, it *appeared* to lead with demonstrative evidence, nothing farther is requisite to illustrate the practical tendency of a system, which, absolving men from the obligations imposed on them, with so commanding an authority, by the moral constitution of human nature, abandons every individual to the guidance of his own narrow views concerning the complicated interests of political society.*

One very obvious consideration seems to have entirely escaped the notice of this, as well as of many other late inquiries: That, in ethical researches, not less than in those which relate to the material universe, the business of the philosopher is limited to the analytical investigation of general laws from the observed phenomena; and that if, in any instance, his conclusions should be found inconsistent with acknowledged facts, the former must necessarily be corrected or modified by the latter. On such occasions, the ultimate appeal must be always made to the moral sentiments and emotions of the human race. The representations, for example, which we read with so much delight, in those poets, of whatever age and country, who have most successfully touched the human heart;—of the heroical sacrifices made to gratitude, to parental duty, to filial piety, to conjugal affection;—are not amenable to the authority of any ethical theory, but are the most authentic records of the phenomena which it is the object of such theories to generalize. The sentiment of Publius Syrus—*Omne dixeris maledictum, quum ingratum hominem dixeris*—speaks a language which accords with every feeling of an unperverted mind;—it speaks the language of Nature, which it is the province of the moralist, *not* to criticise, but to listen to with reverence. By employing our reason to interpret and to obey this, and the other moral suggestions of the heart, we may trust with confidence, that we take the most effectual means in our power to augment the sum of human happiness;—but the discovery of this connexion between *virtue* and *utility* is the slow result of extensive and philosophical combinations; and it would soon cease to have a foundation in truth, if men were to substitute their own conceptions of expediency, instead of those rules of action which are inspired by the wisdom of God.*

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* It is remarkable that Mr. Hume, by far the ablest advocate for the theory in question, has indirectly acknowledged its inconsistence with some of the most important facts which it professes to explain. "Though the *heart* (he observes in the 5th section of his Inquiry concerning Morals) takes not part entirely with those general notions, nor regulates all its love and hatred by the universal abstract differences of vice and virtue, without regard to self, and the persons with whom we are more intimately connected; yet have these moral differences a considerable influence, and being sufficient, at least for discourse, serve all the purposes in company, in the pulpit, on the theatre, and in the schools."—On this passage, the following very curious note is to be found at the end of the volume; a note (by the way) which deserves to be added to the other proofs already given of the irresistible influence which the doctrine of final causes occasionally exercises over the most sceptical minds. "*It is wisely ordained by nature*, that private connexions should *commonly* prevail over universal views and considerations; otherwise our affections and actions would be dissipated and lost, for want of a proper limited object."—Does not this remark imply an acknowledgment, First, That the principle of general expediency (the *sole* principle of virtuous conduct, according to Mr. Hume, in our most important transactions with our fellow creatures) would not contribute to the happiness of society, if men should *commonly* act upon it; and, Secondly, That some provision is made in our moral constitution, that we shall, in fact, be influenced by other motives in discharging the offices of private life?

It must not be concluded from the foregoing observations, that, even in ethical inquiries, the consideration of final causes is to be rejected. On the contrary, Mr. Smith himself, whose logical precepts on this subject I have now been endeavouring to illustrate and enforce, has frequently indulged his curiosity in speculations about *uses* or *advantages*; and seems plainly to have considered them as important objects of philosophical study, not less than *efficient* causes. The only caution to be observed is, that the one may not be confounded with the other.

Between these two different researches, however, there is, both in physics and ethics, a very intimate connexion. In various cases, the consideration of final causes has led to the discovery of some general law of nature; and, in almost every case, the discovery of a general law clearly points out some wise and beneficent purposes to which it is subservient. Indeed it is chiefly the prospect of such applications which renders the investigation of general laws interesting to the mind.†

CONCLUSION OF PART SECOND.

In the foregoing chapters of this Second Part, I have endeavoured to turn the attention of my readers to various important questions relating to the Human Understanding; aiming, in the first place, to correct some fundamental errours in the theories commonly received with respect to the powers of intuition and of reasoning; and, secondly, to illustrate some doctrines connected with the groundwork of the inductive logic, which have been either overlooked, or misapprehended by the generality of preceding writers. The bulk to which the volume has already extended, renders it impossible for me now to attempt a detailed recapitulation of its contents:—Nor do I much regret the necessity of this omission, having endeavoured, in every instance, as far as I could, to enable the intelligent reader to trace the thread of my discussions.

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* See Note (CC.)

† See note (DD.)

In a work professedly elementary, the frequent references made to the opinions of others may, at first sight, appear out of place; and it may not unnaturally be thought, that I have too often indulged in *critical* strictures, where I ought to have confined myself to a didactic exposition of first principles. To this objection I have only to reply, that my aim is not to supplant any of the established branches of academical study; but, by inviting and encouraging the young philosopher, when his academical career is closed, to review, with attention and candour, his past acquisitions, to put him in the way of supplying what is defective in the present systems of education. I have accordingly entitled my book, Elements—not of Logic or of Pneumatology, but—of the Philosophy of the Human Mind; a study which, according to my idea of it, presupposes a general acquaintance with the particular departments of literature and of science, but to which I do not know that any elementary introduction has yet been attempted. It is a study, indeed, whereof little more perhaps than *the elements* can be communicated by the mind of one individual to that of another.

In proof of this, it is sufficient here to hint, (for I must not at present enlarge on so extensive a topic,) that a knowledge of the general laws which regulate the intellectual phenomena is, to the logical student, of little practical value, but as a preparation for the study of Himself. In this respect, the anatomy of the mind differs essentially from that of the body; the structure of the former (whatever collateral aids may be derived from observing the varieties of genius in our fellow-creatures) being accessible to those alone who can retire into the deepest recesses of their own internal frame; and even to *these* presenting, along with the generic attributes of the race, many of the specific peculiarities of the individual. On this subject, every writer, whose speculations are at all worthy of notice, must draw his chief materials from within; and it is only by comparing the conclusions of *different* writers, and subjecting all of them to the test of our personal experience, that we can hope to separate the essential principles of the human constitution from the unsuspected effects of education and of temperament;* or to apply with advantage, to our particular circumstances, the combined results of our reading and of our reflections. The constant appeal which, in such inquiries, the reader is thus forced to make to his own consciousness and to his own judgment, has a powerful tendency to form a habit, not more essential to the success of his metaphysical researches, than of all his other speculative pursuits.

Nearly connected with this habit, is a propensity to weigh and to ascertain the exact import of words; one of the nicest and most difficult of all analytical processes; and *that* upon which more stress has been justly laid by our best modern logicians, than upon any other *organ* for the investigation of truth. For the culture of this propensity, no science is so peculiarly calculated to prepare the mind, as the study of its own operations. *Here*, the imperfections of words constitute the principal obstacle to our progress; nor is it possible to advance a single step, without struggling against the associations imposed by the illusions of metaphorical terms, and of analogical theories. Abstracting, therefore, from its various practical applications, and considering it merely as a gymnastic exercise to the reasoning powers, this study seems pointed out by nature, as the best of all schools for inuring the understanding to a cautious and skilful employment of language as the instrument of thought.

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* I use the word *temperament*, in this instance, as synonymous with the *idiosyncrasy* of medical authors; a term which I thought might have savoured of affectation if applied to the *mind*; although authorities for such an employment of it are not wanting among old English writers. One example, directly in point, is quoted by Johnson from Glanville. "The understanding also hath its *idiosyncracies*, as well as other faculties."

The two first chapters of this volume relate to logical questions, on which the established opinions appear to me to present stumbling-blocks at the very threshold of the science. In treating of these, I have canvassed with freedom, but, I hope, with due respect, the doctrines of some illustrious moderns, whom I am proud to acknowledge as my masters; of those more particularly, whose works are in the highest repute in our British Universities, and whose errours I was, on that account, the more solicitous to rectify. For the space allotted to my criticisms on Condillac, no apology is necessary to those, who have the slightest acquaintance with the present state of philosophy on the continent, or who have remarked the growing spread, in this Island, of some of his weakest and most exceptionable theories.—On various controverted points connected with the theory of evidence, both demonstrative and experimental, I trust, with some confidence, that I shall be found to have thrown considerable light: in other instances, I have been forced to content myself with proposing my doubts; leaving the task of solving them to future inquirers. To awaken a dormant spirit of discussion, by pointing out the imperfections of generally received systems, is at least one step gained towards the farther advancement of knowledge.

It is justly and philosophically remarked by Burke, that "nothing "tends more to the corruption of science than to suffer it to stag- "nate. These waters must be troubled before they can exert their "virtues. A man who works beyond the surface of things, though "he may be wrong himself, yet he clears the way for others, and "may chance to make even his errours subservient to the cause "of truth."*

The subsequent chapters, relative to the Baconian Logic, bear, all of them, more or less, in their general scope, on the theory of the intellectual powers, and on the first principles of human knowledge. In this part of my work, the reader will easily perceive, that I do not profess to deliver logical precepts; but to concentrate, and to reflect back on the Philosophy of the Mind, whatever scattered lights I have been able to collect from the experimental researches to which that Philosophy has given birth. I have aimed, at the same time (and I hope not altogether without success,) to give somewhat more of precision to the technical phraseology of the Baconian school, and of correctness to their metaphysical ideas.

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* Inquiry into the Sublime and Beautiful, Part I. Sect. xix.

Before concluding these speculations, it may not be improper to caution my readers against supposing, that when I speak of the Baconian school, or of the Baconian logic, I mean to ascribe entirely to the *Novum Organon*, the advances made in physical science, since the period of its publication. The singular effects of this, and of the other inestimable writings of the same author, in forwarding the subsequent progress of scientific discovery, certainly entitle his name, far more than that of any other individual, to be applied as a distinguishing epithet to the modern rules of philosophizing; but (as I have elsewhere observed) "the genius and writings of Bacon "himself were powerfully influenced by the circumstances and character of his age: Nor can there be a doubt, that he only accelerated a revolution which was already prepared by many concurrent causes."*—My reasons for thinking so, which rest chiefly on historical retrospects, altogether foreign to my present design, I must delay stating, till another opportunity.

To this observation it is of still greater importance to add, that, in contrasting the spirit and the utility of the new logic with those of the old, I have no wish to see the former substituted, in our universities, in room of the latter. By a strange inversion in the order of instruction, Logic, instead of occupying its natural place at the close of the academical course, has always been considered as an introduction to the study of the sciences; and has, accordingly, been obtruded on the uninformed minds of youth, at their first entrance into the schools. While the syllogistic art maintained its reputation, this inversion was probably attended with little practical inconvenience; the trite and puerile examples commonly resorted to for the illustration of its rules, presupposing a very slender stock of scientific attainments; but now, when the word Logic is universally understood in a more extensive sense, as comprehending, along with an outline of Aristotle's *Organon*, some account of the doctrines of Bacon, of Locke, and of their successors, it seems indispensably necessary, that this branch of education should be delayed till the understanding has acquired a wider and more varied range of ideas, and till the power of *reflection* (the last of our faculties which nature unfolds) begins to solicit its appropriate nourishment. What notions can be annexed to such words as analysis, synthesis, induction, experience, analogy, hypothetical and legitimate theories, demonstrative and moral certainty, by those whose attention has hitherto been exclusively devoted to the pursuits of classical learning? A fluent command, indeed, of this technical phraseology may be easily communicated; but it would be difficult to devise a more effectual expedient for misleading, at the very outset of life, the inexperienced and unassured judgment. The perusal of Bacon's writings, in particular, disfigured as they are by the frequent use of quaint and barbarous expressions, suited to the scholastic taste of his contemporaries, ought to be carefully reserved for a riper age.[*]

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* Outlines of Moral Philosophy, first printed in 1793.

In confirmation of this last remark, many additional arguments might be drawn from the peculiar circumstances in which Bacon wrote. At the period when he entered on his literary career, various branches of physical science were already beginning to exhibit the most favourable presages of future improvement; strongly inviting his original and powerful mind to co-operate in the reformation of philosophy. The turn of his genius fortunately led him to employ himself chiefly in general suggestions for the advancement of learning; and, leaving to others the task of inductive investigation, to aim rather at stating such rules as might direct and systematize their exertions. In his own experimental researches he was not very fortunate; nor is much reliance to be placed on the facts recorded in his *Histories*. Perhaps the comprehensiveness of his views diminished his curiosity with respect to the particular objects of science; or, perhaps, he found the multiplicity of his engagements in active life, more consistent with speculations, in which the chief materials of his reasonings were to be drawn from his own reflections, than with inquiries which demanded an accurate observation of external phenomena, or a minute attention to experimental processes. In this respect, he has been compared to the Legislator of the Jews, who conducted his followers within sight of their destined inheritance; and enjoyed, in distant prospect, that promised land which he himself was not permitted to enter.[†]

The effect of this prophetic imagination in clothing his ideas, to a greater degree than a severe logician may approve, with the glowing colours of a poetical diction, was unavoidable. The wonder is, that his style is so seldom chargeable with vagueness and obscurity; and that he has been able to bequeath to posterity so many cardinal and eternal truths, to which the progressive light of science is every day adding a new accession of lustre. Of these truths, however, (invaluable in themselves as heads or texts, pregnant with thought) many,—to borrow the expression of a Greek poet.—*sound only to the intelligent;* while others present those confident but indefinite anticipations of intellectual regions yet undiscovered, which, though admirably calculated to keep alive and to nourish the man of science, are more fitted to awaken the enthusiasm, than to direct the studies of youth. Some of them, at the same time (and *these*, I apprehend, cannot be too early impressed on the memory) are singularly adapted to enlarge and to elevate the conceptions; exhibiting those magnificent views of knowledge, which, by identifying its progress with the enlargement of human power and of human happiness, ennoble the humblest exertions of literary industry, and annihilate, before the triumphs of genius, the most dazzling objects of vulgar ambition.—A judicious selection of such passages, and of some general and striking aphorisms from the Novum Organon, would form a useful manual for animating the academical tasks of the student; and for gradually conducting him from the level of the subordinate sciences, to the *vantage-ground* of a higher philosophy.

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[*] Haller mentions, in his Elements of Physiology, that he was forced to enter on the study of logic in the tenth year of his age. "Memini me annum natum decimum, quo avidus historiam et poesin devorassem, ad logicam, et ad Claubergianam logicam ediscendam coactum fuisse, quâ nihil poterat esse, pro hujusmodi homuncione, sterilius."[‡] (Tomus VIII. Pars Secunda, p. 24. Lausannae, 1778.) It seems difficult to imagine any attempt more extravagant, than that of instructing a child, only ten years old, in the logic of the schools; and yet it is by no means a task so completely impracticable, as to convey to a pupil, altogether uninitiated in the Elements of Physics, a distinct idea of the object and rules of the Novum Organon.

The example of Mr. Smith, during the short time he held the Professorship of Logic at Glasgow, is worthy of imitation in those universities which admit of similar deviations from old practices. For an account of his plan, see Biographical Memoirs of Smith, Robertson, and Reid, p. 12; where I have inserted a slight but masterly sketch of his academical labours, communicated to me by his pupil and friend, the late Mr. Millar.

[†] See Cowley's Ode, prefixed to Sprat's History of the Royal Society.

Nor does Bacon himself seem to have been at all disposed to overrate the value of his own contributions to Experimental Science. "In rebus quibuscunque difficilioribus," he has observed on one occasion, "non expectandum est ut quis simul et serat et metat; sed

[‡] [I remember that in my tenth year, when I could have eagerly devoured poetry *history, I was compelled* to study logic, and that the logic of Claubergius; than which *thing, to a boy of that age,* could possibly be more useless.]

Unwilling as I am to touch on a topic so hopeless as that of Academical Reform, I cannot dismiss this subject, without remarking, as a *fact* which, at some future period will figure in literary history, that two hundred years after the date of Bacon's philosophical works, the antiquated routine of study, originally prescribed in times of scholastic barbarism and of popish superstition, should, in so many Universities, be still suffered to stand in the way of improvements, recommended at once by the present state of the sciences, and by the order which nature follows in developing the intellectual faculties. On this subject, however, I forbear to enlarge.—Obstacles of which I am not aware may perhaps render any considerable innovations impracticable; and, in the mean time, it would be vain to speculate on ideal projects, while the prospect of realizing them is so distant and uncertain.

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praeparatione opus est, ut per gradus maturescant."* But the most remarkable passage of this sort, which I recollect in his writings, occurs towards the close of his great work, *De Augmentis Scientiarum*:—Tandem igitur paululum respirantes, atque ad ea, quae praetervecti sumus, oculos reflectentes, hunc tractatum nostrum non absimilem esse censemus sonis illis et praeludiis, quae praetentant Musici, dum fides ad modulationem concinnant: Quae ipsa quidem auribus ingratum quiddam et asperum exhibent; at in causa sunt, ut quae sequuntur omnia sint suaviora: Sic nimirum nos in animum induximus, ut in cithara Musarum concinnanda, et ad harmoniam veram redigenda, operam navaremus, quo ab aliis postea pulsentur chordae, meliore digito, aut plectro."†—*Bacon.*

* [In difficult pursuits, it ought not to be expected, that any one should both sow and reap together. There is a necessity for previous labour, that the fruits may gradually reach maturity.]

† [And now respiring, and casting my eyes backwards to those things which I have left behind, I cannot help thinking that this treatise of mine resembles, in some degree, those notes and preludes, which Musicians are wont to produce, while they try their instruments and cause them to harmonise. Such sounds are indeed harsh and unfeeling to the ear, yet are necessary to the sweetness of the concert which follows; so I have been induced to bestow my labour in tuning the lyre to the Muses, and reducing it to an exact harmony, that others may hereafter strike the chords with a more skilful hand.]

NOTES AND ILLUSTRATIONS.

Note (A.) page 29.

Of the fault in Euclid's arrangement which I have here remarked, some of the ancient editors were plainly aware, as they removed the two *theorems* in question from the class of axioms, and placed them, with at least an equal impropriety, in that of postulates. “ In quibusdam codicibus (says Dr. Gregory) Axiomata 10 et
“ 11 inter postulata numerantur.” (Euclidis quae supersunt omnia. Ex Recens. Dav. Gregorii. Oxon. 1703. p. 3.)

The 8th Axiom too in Euclid's enumeration is evidently out of its proper place. Και τα εφαρμοζοντα επ' αλληλα ισα αλληλοις εστι:—thus translated by Dr. Simson;
“ Magnitudes which coincide with one another, that is, which exactly fill the same
“ space, are equal to one another.” This, in truth, is not an axiom, but a definition. It is the definition of geometrical equality; the fundamental principle upon which the comparison of all geometrical magnitudes will be found ultimately to depend.

For *some* of these slight logical defects in the arrangement of Euclid's definitions and axioms, an ingenious, and, I think, a solid apology has been offered by M. Prevost, in his *Essais de Philosophie*. According to this author (if I rightly understand his meaning) Euclid was himself fully aware of the objections to which this part of his work is liable; but found it impossible to obviate them, without incurring the still greater inconvenience of either departing from those modes of proof which he had resolved to employ exclusively in the composition of his Elements;[*] or of revolting the student, at his first outset, by prolix and circuitous demonstrations of manifest and indisputable truths.—I shall distinguish by Italicks, in the following quotation, the clauses to which I wish more particularly to direct the attention of my readers.

“ C'est donc l'imperfection (peut-être inévitable) de nos conceptions, qui a en-
“ gagé à faire entrer les axiomes pour quelque chose dans les principes des sciences
“ de raisonnement pur. Et ils y font un double office. Les uns remplacent des
“ définitions. Les autres remplacent des propositions susceptibles d'être démon-
“ trées. J'en donnerai des exemples tirés des Elémens d' Euclide.

“ Les axiomes remplacent quelquefois des définitions très faciles à faire comme
“ celle du mot *tout*. (El. Ax. 9.) *D'autres suppléent à certaines définitions diffi-*
“ *ciles et qu'on évite, comme celles de la ligne droite et de l'angle.*

“ Quelques axiomes remplacent des théorèmes. J'ignore si (dans les principes
“ d'Euclide) l'axiome 11. peut-être démontré (comme l'ont cru Proclus et tant d'au-
“ tres anciens et modernes.) *S'il peut l'être, cet axiome supplée à une démonstration*
“ *probablement laborieuse.*

“ Puisque les axiomes ne font autre office que suppléer à des definitions et à des
“ théorèmes, on demandera peut-être qu'on s'en passe. Observons 1. *Qu'ils evi-*
“ *tent souvent des longueurs inutiles.* 2. *Qu'ils tranchent les disputes à l'epoque*
“ *même ou la sçience est imparfaite.* 3. *Que s'il est un état, auquel la science puisse*
“ *s'en passer (ce que je n'affirme point) il est du moins sage et même indispensable,*

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[*] By introducing, for example, the idea of *Motion*, which he has studied to avoid, as much as possible, in delivering the *Elements of Plane Geometry*.

“ *de les employer, tant que quelque insuffisance, dans ce degré de perfection où l'on* “ *tend, interdit un ordre absolument irréprochable.* Ajoutons 4. Que dans “ chaque science il y a ordinairement un principe qu'on pourroit appeller dominant, “ et qui par cette raison seule (et indépendamment de celles que je viens d'alléguer) a paru devoir être sorti, pour ainsi dire, du champ des définitions pour “ être mis en vue sous forme d'axiome. Tel me paroit être en géométrie le prin- “ cipe de congruence contenu dans le 8 Axiome d'Euclide.”* (Essais de Philosophie, tom. ii. pp. 30, 31, 32.)

These remarks go far, in my opinion, towards a justification of Euclid for the latitude with which he has used the word, Axiom, in his Elements. As in treating, however, of the fundamental laws of human belief, the utmost possible precision of language is indispensably necessary, I must beg leave once more to remind my readers, that, in denying *Axioms* to be the first principles of reasoning in mathematics, I restrict the meaning of that word to such as are analogous to the first seven in Euclid's list. Locke, in what he has written on the subject, has plainly understood the word in the same limited sense.

Note (B.) page 45.

The prevalence in India of an opinion bearing *some* resemblance to the Berkeleian Theory may be urged as an objection to the reasoning in the text; but the fact is, that this resemblance is much slighter than has been generally apprehended. (See Philosophical Essays, pp. 81, 82, et seq.) On this point the following passage from Sir William Jones is decisive; and the more so, as he himself has fallen into the common mistake of identifying the Hindu Belief with the conclusions of Berkeley and Hume.

“ The fundamental tenet of the *Védánti* school consisted, *not in denying the ex-* “ *istence of matter, that is, of solidity, impenetrability, and extended figure* (*to* “ *deny which would be lunacy,*) *but in correcting the popular notion of it,* and “ in contending, that it has no essence independent of mental perception, that exis- “ tence and perceptibility are convertible terms, that external appearances and “ sensations are illusory, and *would vanish into nothing, if the divine energy,* “ *which alone sustains them, were suspended but for a moment;*† an opinion,

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* [It is then the imperfection, perhaps inevitable, of our conceptions, which has occasioned the introduction of axioms, for certain purposes, into the beginning of sciences of pure reasoning. They serve here a double purpose. Some supply the place of definitions, others of propositions, susceptible of demonstration. I shall give examples of these drawn from the Elements of Euclid.

Some axioms stand in the stead of easy definitions, as of the word, *all. Others of definitions which are difficult and which we prefer to avoid; as those of a right line and of an angle.* Some axioms supply the place of theorems. I know not if the eleventh axiom of Euclid can be demonstrated, as supposed by Proclus and so many others both ancient and modern. *If so, this axiom stands in place of a demonstration probably difficult.*

Since axioms serve no other purpose than to supply the place of definitions and theorems, some perhaps will think it better wholly to omit them; I reply, 1. *They often enable us to avoid a long and useless process.* 2. *They cut short disputes which arise in the infancy of a science.* 3. *If there be a period when a science can do without them, which I do not assert, it is yet wise, and even necessary, to make use of them so long as any falling short of the perfection which we attempt, prevents the series of reasoning from being perfect.* I add, 4. In every science there commonly exists some one principle which we may consider as more important than any other, and which for this reason only, independent of others which I shall point out, ought to be chosen from amidst the crowd of definitions, and presented as an axiom. Such appears to me, in geometry, the principle of coincidence in the 8th axiom of Euclid.]

† Sir William Jones here evidently confounds the system which represents the material universe, as not only at first *created*, but as every moment *upheld* by the agency of Divine Power, with that of Berkeley and Hume, which, denying the distinction between primary

“ which Epicharmus and Plato seem to have adopted, and which has been main-
“ tained in the present century with great elegance, but with little public applause;
“ partly because it has been misunderstood, and partly because it has been misap-
“ plied by the false reasoning of some unpopular writers, who are said to have dis-
“ believed in the moral attributes of God, whose omnipresence, wisdom, and good-
“ ness are the basis of the Indian philosophy. I have not sufficient evidence on this
“ subject to profess a belief in the doctrines of the *Védánta*, which human reason
“ alone could, perhaps, neither fully demonstrate, nor fully disprove; but it is
“ manifest, that nothing can be farther removed from impiety than a system wholly
“ built on the purest devotion.” (Works of Sir William Jones, Vol. I. pp. 165, 166.)

From these observations (in some of which I must be permitted to say, there is a good deal of indistinctness, and even of contradiction,) it may on the whole be inferred, 1. That in the tenets of the Védánti school, however different from the first apprehensions of the unreflecting mind, there was nothing *inconsistent* with the fundamental laws of human belief, any more than in the doctrine of Copernicus concerning the earth's motion. 2. That these tenets were rather articles of a theological creed, than of a philosophical system; or at least, that the two were so blended together, as sufficiently to account for the hold which, independently of any refined reasoning, they had taken of the popular belief.)

In this last conclusion I am strongly confirmed, by a letter which I had the pleasure of receiving, a few years ago, from my friend Sir James Mackintosh, then recorder at Bombay. His good nature will, I trust, pardon the liberty I take, in mentioning his name upon the present occasion, as I wish to add to the following very curious extract, the authority of so enlightened and philosophical an observer.— Amidst the variety of his other important engagements, it is to be hoped that the results of his literary researches and speculations, while in the East, will not be lost to the world.

. . . . . . “ I had yesterday a conversation with a young Bramin of no
“ great learning, the son of the Pundit (or assessor for Hindu law) of my court.
“ He told me, that besides the myriads of gods whom their creed admits, there was
“ one whom they know by the name of Brim, or the great one, without form or
“ limits, whom no created intellect could make any approach towards conceiving;
“ that, in reality, there were no trees, no houses, no land, no sea, but all without
“ was Maia, or illusion, the act of Brim; that whatever we saw or felt, was only
“ a dream, or, as he expressed it in his imperfect English, thinking in one's sleep,
“ and that the reunion of the soul to Brim, from whom it originally sprung, was
“ the awakening from the long sleep of finite existence. All this you have heard
“ and read before as Hindu speculation. What struck me was, that speculations
“ so refined and abstruse should, in a long course of ages, have fallen through so
“ great a space as that which separates the genius of their original inventor from
“ the mind of this weak and unlettered man. The names of these inventors have
“ perished; but their ingenious and beautiful theories, blended with the most mon-
“ strous superstitions, have descended to men very little exalted above the most ig-
“ norant populace, and are adopted by them as a sort of articles of faith, without a
“ suspicion of their philosophical origin, and without the possibility of comprehend-
“ ing any part of the premises from which they were deduced. I intend to investi-
“ gate a little the history of these opinions, for I am not altogether without appre-
“ hension, that we may all the while be mistaking the hyperbolical effusions of
“ mystical piety, for the technical language of a philosophical system. Nothing is
“ more usual, than for fervent devotion to dwell so long and so warmly on the mean-
“ ness and worthlessness of created things, and on the all-sufficiency of the Su-
“ preme Being, that it slides insensibly, from comparative to absolute language,
“ and, in the eagerness of its zeal to magnify the Deity, seems to *annihilate* every
“ thing else. To distinguish between the very different import of the same words
“ in the mouth of a mystic and of a sceptic, requires more philosophical discrimi-
“ nation than most of our Sanscrit investigators have hitherto shewn.”

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and secondary qualities, asserts, that extension, figure, and impenetrability are not less inconceivable without a *percipient* mind, than our sensations of heat and cold, sounds and odours. According to both systems, it may undoubtedly be said, that the material universe has no existence independent of *mind*; but it ought not to be overlooked, that in the *one*, this word refers to the Creator, and in the *other*, to the created percipient.

Note (C.) page 51.

The private correspondence here alluded to, was between Mr. Hume and the late Sir Gilbert Elliot; a gentleman who seems to have united, with his other well-known talents and accomplishments, a taste for abstract disquisitions, which rarely occurs in men of the world; accompanied with that soundness and temperance of judgment which, in such researches, are so indispensibly necessary to guard the mind against the illusions engendered by its own subtilty. In one of his letters (of which the original draft in his own hand-writing was communicated to me by the Earl of Minto,)he expresses himself thus:*

. . "I admit, that there is no writing or talking of any subject which is of importance enough to become the object of reasoning, without having recourse to "some degree of subtilty and refinement. The only question is, where to stop, "how far we can go, and why no farther? To this question I should be extremely "happy to receive a satisfactory answer. I can't tell if I shall rightly express "what I have just now in my mind; but I often imagine to myself, that I perceive "within me a certain instinctive feeling, which shoves away at once all over "subtile refinements, and tells me, with authority, that these air-built notions are "inconsistent with life and experience, and by consequence cannot be true or solid. "From this I am led to think, that the speculative principles of our nature ought "to go hand in hand with the practical ones; and, for my own part, when the "former are so far pushed, as to leave the latter quite out of sight, I am always "apt to suspect that we have transgressed our limits. If it should be asked, how "far will these practical principles go? I can only answer, that the former difficulty "will recur, unless it be found that there is *something* in the intellectual *part* of "our nature, resembling the moral sentiment in the moral part of our nature, "which determines this, as it were instinctively. Very possibly, I have wrote "nonsense: However, this notion first occurred to me at London, in conversation "with a man of some depth of thinking; and talking of it since to your friend "Henry Home,† I found that he seemed to entertain some notions nearly of the "same kind, and to have pushed them much farther." . . .

The *practical principles* referred to in this extract, seem to me to correspond very nearly with what I have called *fundamental laws of belief*, or *first elements of human reason;* and the SOMETHING *in the intellectual part of our nature, resembling the moral sentiment in the moral part of our nature*, is plainly descriptive of what Reid and others have since called *common sense;*—coinciding, too, in substance with the philosophy of Lord Kames, who refers our belief of the existence of the Deity, and of various other primary truths, to particular *senses*, forming a constituent part of our intellectual frame. I do not take upon me to defend the forms of expression which Mr. Hume's very ingenious correspondent has employed to convey his ideas; and which, it is probable, he did not think it necessary for him, in addressing a confidential friend to weigh with critical exactness; but his doctrine must be allowed to approximate remarkably to those parts of the works of Reid, where he appeals from the paradoxical conclusions of metaphysicians, to the principles on which men are compelled, by the constitution of their nature, to judge and to act in the ordinary concerns of life;—as well as to various appeals of the same kind, which occur in Lord Kames's writings. My principal object, however, in introducing it here, was to shew, that this doctrine was the natural result of the state of science at the period when Reid appeared; and consequently, that no argument against his originality in adopting it, can reasonably be founded on a coincidence between his views concerning it and those of any preceding author.

Of Mr. Hume's respect for the literary attainments of this correspondent, so strong a proof occurs in a letter, (dated Ninewells, March 10, 1751) that I am tempted to subjoin to the foregoing quotation the passage to which I allude.

"You would perceive, by the sample I have given you, that I make Cleanthes "the hero of the dialogue. Whatever you can think of to strengthen that side of "the argument, will be most acceptable to me. Any propensity you imagine I have "to the other side crept in upon me against my will; and 'tis not long ago that I burned

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* The letter is dated in 1751.

† Afterwards Lord Kames.

" an old manuscript-book, wrote before I was twenty, which contained, page after " page, the gradual progress of my thoughts on that head. It began with an anx- " ious search after arguments to confirm the common opinion :—Doubts stole in,— " dissipated,—returned,—were again dissipated,—returned again: And it was a " perpetual struggle of a restless imagination against inclination, perhaps against " reason.

" I have often thought, that the best way of composing a dialogue would be, for " two persons that are of different opinions about any question of importance, to " write alternately the different parts of the discourse, and reply to each other. " By this means that vulgar errour would be avoided, of putting nothing but non- " sense into the mouth of the adversary ; and, at the same time, a variety of char- " acter and genius being upheld, would make the whole look more natural and un- " affected. Had it been my good fortune to live near you, I should have taken " upon me the character of Philo in the dialogue, which you'll own I could have " supported naturally enough ; and you would not have been averse to that of " Cleanthes."

In a postcript to this letter, Mr. Hume recurs to the same idea. " If you'll be " persuaded to assist me in supporting Cleanthes, I fancy you need not take the " matter any higher than Part 3. He allows, indeed, in Part 2d, that all our in- " ference is founded on the similitude of the works of nature to the usual effects of " mind : otherwise they must appear a mere chaos. The only difficulty is, why " the other dissimilitudes do not weaken the argument: And, indeed, it would " seem from experience and feeling, that they do not weaken it so much as we " might reasonably expect. A theory to solve this would be very acceptable."*

Note (D.) page 54.

It would perhaps be difficult to mention another phrase in our language, which admits of so great a variety of interpretations, as *common sense ;* and to which, of consequence, it could have been equally dangerous to annex a new technical meaning in stating a controversial argument. Dr. Beattie has enumerated some of these in the beginning of his Essay, but he has by no means exhausted the subject; nor is his enumeration altogether unexceptionable in point of logical distinctness. On this point, however, I must allow my readers to judge for themselves. (See Essay on the Nature and Immutability of Truth, p. 37, et seq. 2d edit.)

The Latin phrase *sensus communis* has also been used with much latitude. In various passages of Cicero it may be perfectly translated by the English phrase *common sense ;* and, in the same acceptation, it is often employed in modern latinity. Of this (not to mention other authorities) many examples occur in the *Lectiones Mathematicae* of Dr. Barrow ; a work not more distinguished by originality and depth of thought, than by a logical precision of expression. In one of these, he appeals to *common sense*, (*sensus communis*,) in proof of the circumference of the circle being less than the perimeter of the circumscribed square. (Lect. 1.)

On other occasions, the *sensus communis* of classical writers plainly means something widely different ;—as in those noted lines of Juvenal, so ingeniously illustrated by Lord Shaftesbury, in his Essay on the Freedom of Wit and Humour.

> " Haec satis ad juvenem, quem nobis fama superbum
> Tradit, et inflatum, plerumque Nerone propinquo.
> Rarus enim ferme *sensus communis* in illâ
> Fortuna."† ————

" Some commentators (says Shaftesbury) interpret this very differently from " what is generally apprehended. They make this *common sense* of the poet, by

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[*] From the above quotations it appears, that Mr. Hume's posthumous work, entitled Dialogues concerning Natural Religion was projected, and, in part at least, executed, twenty five years before his death.

† Yet amply this suffic'd the youth, as fame
Reports, who, swell'd with pride that Nero's name
Was kindred with his own. What weak pretence !
High birth is seldom bless'd with *common sense*. MARSH.

"a Greek derivation, to signify sense of public weal, and of the common interest; "love of the community or society, natural affection, humanity, obligingness, or "that sort of civility which rises from a just sense of the common rights of man-"kind, and the natural equality there is among those of the same species.

"And, indeed, if we consider the thing nicely, it must seem somewhat hard in the "poet to have deny'd wit or ability to a court such as that of Rome, even under a "Tiberius or a Nero. But for humanity or sense of public good, and the common "interest of mankind, 'twas no such deep satire to question whether this was pro-"perly the spirit of a court. 'Twas difficult to apprehend what Community sub-"sisted among courtiers; or what Public among an absolute Prince and his slave-"subjects. And for real *society*, there could be none between such as had no oth-"er *sense* than that of private good.

"Our poet, therefore, seems not so immoderate in his censure; if we consider it "is the *heart*, rather than the *head* he takes to task: when reflecting on a court-"education, he thinks it unapt to raise any affection towards a country: and looks "upon young Princes and Lords as the *young masters* of the world; who, being "indulged in all their passions, and trained up in all manner of licentiousness, "have that thorough contempt and disregard of Mankind, which Mankind in a "manner deserves, where arbitrary power is permitted, and a tyranny adored."

While I entirely agree with the general scope of these observations, I am inclined to think, that the *sensus communis* of Juvenal might be still more precisely render-ed by *sympathy*; understanding this word (in the appropriate acceptation annexed to it by Mr. Smith) as synonymous with that fellow-feeling which disposes a man, in the discharge of his social duties, to place himself in the situation of others, and to regulate his conduct accordingly. Upon this supposition, the reflection in ques-tion coincides nearly with one of Mr. Smith's own maxims, that "the great never "look upon their inferiours as their fellow-creatures;"*—a maxim which, although sufficiently founded in fact to justify the sarcasm of the satirical poet, must (it is to be hoped for the honour of human nature) be understood with considerable limita-tions, when stated as a correct enunciation of philosophical truth.

It yet remains for me to take some notice of the *sensus communis* of the school-men; an expression with is perfectly synonymous with the word *conception*, as de-fined in the first volume of this work. It denotes the power whereby the mind is enabled to *represent* to itself any absent object of perception, or any sensation which it has formerly experienced. Its *seat* was supposed to be that part of the brain (hence called the *sensorium*, or the *sensorium commune*) where the nerves from all the organs of perception terminate. Of the peculiar function allotted to it in the scale of our intellectual faculties, the following account is given by Hobbes. "Some say the senses receive the species of things, and deliver them to the Com-"mon Sense; and the Common Sense delivers them over to the Fancy; and the "Fancy to the Memory; and the Memory to the Judgment;—like handing of "things from one to another, with many words making nothing understood." (*Of Man*, Part I. Chap. 2.)

Sir John Davis, in his poem on the Immortality of the Soul (published in the reign of Queen Elizabeth,) gives the name of *common sense* to the power of *imagina-tion* (see Sections XIX. and XX.;) and the very same phraseology occurs, at a la-ter period, in the Philosophy of Des Cartes: (see, in particular, his Second Medi-tation, where he uses *Sensus Communis* as synonymous with *Potentia Imagina-trix*.) Both of these writers, as appears evidently from the context, understand by *Imagination* what I have called *Conception*. To the power *now* denoted by the word *Imagination*, Sir John Davis gives the name of *Fantasy*.—Gassendi seems disposed to consider this use of the phrase *Sensus Communis* as an innovation of Des Cartes, (see his objection to Des Cartes' Second Meditation, § 6.) but it had been previously adopted by various philosophical writers; and, in the English schools, was at that time familiar to every ear.

The singular variety of acceptations of which this phrase is susceptible: and the figure which, on different occasions, it has made in the history of philosophy, will, I trust, furnish a sufficient apology for the length as well as for the miscellane-ous nature of the foregoing remarks.†

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* Theory of Moral Sentiments, Vol. I. p. 136. 6th edit.

† It has been observed to me very lately by a learned and ingenious friend, that in one of the phrases which I have proposed to substitute for the common sense of Buffier and

Note (E.) page 61.

The Arithmetical Prodigy, alluded to in the text, is an American boy (still, I believe, in London,) of whose astonishing powers in performing, by a mental process, hitherto unexplained, the most difficult numerical operations, some accounts have lately appeared in various literary Journals. When the sheet containing the reference to this Note was thrown off, I entertained the hope of having an opportunity, before reaching the end of the volume, to ascertain, by personal observation, some particulars with respect to him, which I thought might throw light on my conclusions concerning the faculty of attention, in the former volume of this work. In this expectation, however, I have been disappointed; and have, therefore, only to apologize for having inadvertently excited a curiosity which I am at present unable to gratify.

[Since the first edition of this volume was published, I have seen the boy here alluded to; but for too short a time, and under too unfavourable circumstances, to be able to form any satisfactory conclusions concerning the nature of his arithmetical processes. Whatever opinion may be entertained on this point, every person who has witnessed his public exhibitions must allow, that his powers of Memory and of concentrated Attention, when contrasted with his very tender years, and with the constitutional playfulness of his disposition, entitle him to a conspicuous place among the rare phenomena of the intellectual world. Nor can I forbear to add, that the general character of *his own mind* seems to be simple, amiable, and interesting. When farther advanced in life, he may probably have it in his power to communicate some curious information with respect to the origin and history of his peculiar intellectual habits. In the mean time, I must decline, for obvious reasons, to say any thing farther on the subject.]

Note (F.) page 95.

Εν τουτοις ἡ ισοτης ἑνοτης. "In mathematical quantities, equality is identity." (Arist. Met. x. c. 3.)

This passage has furnished to Dr. Gillies (when treating of the theory of syllogisms, (the subject of the following comment, in which, if I do not greatly deceive myself, he has proceeded upon a total misapprehension of the scope of the original. "In mathematical quantities, (Aristotle says, that) equality is sameness," because *ὁ λογος ὁ της πρωτης ουσιας ἑις εστι.* "The definition of any particular object denoted by the one is precisely the same with the definition of any particular object denoted by the other." Gillies's Aristotle, Vol. I. p. 87.)

In order to enable my readers to form a judgment of the correctness of this paraphrase, I must quote Aristotle's words, according to his own arrangement, which, in this instance, happens to be directly contrary to that adopted by his interpreter. *Ετι δε αν ὁ λογος ὁ της πρωτης ουσιας ἑις ῃ, ὡσπερ αἱ ισαι γραμμαι ευθειαι αἱ αυται, και τα ισα και τα ισογωνια τετραγωνα, και τοι πλειω αλλ' εν τουτοις ἡ ισοτης ἑνοτης.* The first clause of this passage is, from its conciseness, obscure; but Aristotle's meaning, on the whole, seems to be this;—"That all those magnitudes which "bear the same *ratio* to the same magnitude, though in fact they may form a "*multitude*, yet, in a scientific view, they may be regarded as *one;* the mathematical notion of equality being ultimately resolvable into that of *unity* or identity."* It was probably to obviate any difficulty that might have been suggested

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Reid, I have been anticipated, two hundred years ago, by Sir Walter Raleigh. "Where natural reason hath built any thing so strong against itself, as the same reason can hardly assail it, much less batter it down; the same, in every question of nature, and infinite power may be approved for a *fundamental law of human knowledge.*" (Preface to Raleigh's History of the World.) The coincidence in point of *expression*, is not a little curious; but is much less wonderful than the coincidence of the *thought* with the soundest logical conclusions of the eighteenth century.—The very eloquent and philosophical passage which immediately follows the above sentence, is not less worthy of attention.

* *Τα προς το αυτο τον αυτον εχοντα λογον, ισα αλληλοις εστι·* Euc. Elem. Lib. V. Prop. ix.

by diversities of *figure*, that Aristotle has confined his examples to equal straight lines, and to such quadrangles as are not only equal but similar.

Let us now consider the paraphrase of Dr. Gillies. "In mathematical quantities, equality is sameness, because the *definition* of any particular object denoted by the one, is precisely the same with the *definition* of any particular object denoted by the other." Are we to understand by this, that "to all things which are equal the same definition is applicable;" or conversely, that "all things to which the same definition is applicable, are equal?" On the former supposition, it would follow, that the same definition is applicable to a circle, and to a triangle having its base equal to the circumference, and its altitude to the radius. On the latter, that all circles are of the same magnitude; all squares, and all equilateral triangles.—There is, indeed, one sense wherein those geometrical figures which are called by the same name, (all circles, for example,) may be identified in the mind of the logician; in as much as any theorem which is proved of one, must equally hold true of all the rest; and the reason of this is assigned, with tolerable correctness, in the last clause of the sentence quoted from Dr. Gillies. But how this reason bears on the question with respect to the convertibility of the terms *equality* and *sameness*, I am at a loss to conjecture.

Note (G.) page 118.

In an Essay on Quantity (by Dr. Reid,) published in the Transactions of the Royal Society of London, for the year 1748, mathematics is very correctly defined to be "the doctrine of measure."—"The object of this science (the author observes) is commonly said to be *quantity;* in which case, quantity ought to be defined, *what may be measured.* Those who have defined quantity to be whatever is capable of more or less, have given too wide a notion of it, which has led some persons to apply mathematical reasoning to subjects that do not admit of it."[*] The appropriate objects of this science are therefore such things alone as admit not only of being increased and diminished, but of being multiplied and divided. In other words, the common quality which characterizes all of them is their *mensurability.*

In the same Essay, Dr. Reid has illustrated, with much ingenuity, a distinction (hinted at by Aristotle[†]) of quantity into proper and improper. "I call that (says he) proper quantity, which is measured by its own kind; or which, of its own nature, is capable of being doubled or trebled, without taking in any quantity of a different kind as a measure of it. Thus a line is measured by known lines, as inches, feet, or miles; and the length of a foot being known, there can be no question about the length of two feet, or of any part or multiple of a foot. This known length, by being multiplied or divided, is sufficient to give us a distinct idea of any length whatsoever.

"Improper quantity is that which cannot be measured by its own kind, but to which we assign a measure in some proper quantity that is related to it. Thus velocity of motion, when we consider it by itself, cannot be measured. We may perceive one body to move faster, another slower, but we can perceive no proportion or ratio between their velocities, without taking in some quantity of another kind to measure them by. Having therefore observed, that by a greater velocity, a greater space is passed over in the same time, by a less velocity a less space, and by an equal velocity an equal space; we hence learn to measure velocity by the space passed over in a given time, and to reckon it to be in exact proportion to that; and having once assigned this measure to it, we can then, and not till then, conceive one velocity exactly double, or triple, or in any pro-

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[*] In this remark, Dr. Reid, as appears from the title of his paper, had an eye to the abuse of mathematical language by Dr. Hutcheson, who had recently carried it so far as to exhibit algebraical formulas for ascertaining the moral merit or demerit of particular actions. (See his Inquiry into the Original of our Ideas of Beauty and Virtue.)

[†] Κυριως δε Ποσα ταυτα λεγεται μονα, τα δε αλλα παντα κατα συμβεβηκος· εις ταυτα γαρ αποβλεποντες, και τα αλλα Ποσα λεγομεν. (Arist. Categ. cap. vi. 17.)

" portion to another. We can then introduce it into mathematical reasoning, " without danger of errour or confusion; and may use it as a measure of other " improper quantities.

" All the proper quantities we know may I think be reduced to these four: extension, duration, number, and proportion.

" Velocity, the quantity of motion, density, elasticity, the vis insita and impressa, the various kinds of centripetal forces, and the different orders of fluxions, are " all improper quantities; which therefore ought not be admitted into mathematical reasoning, without having a measure of them assigned.

" The measure of an improper quantity ought always to be included in the definition of it; for it is the giving it a measure that makes it a proper subject of mathematical reasoning. If all mathematicians had considered this, as carefully as " Sir Isaac Newton has done, some trouble had been saved both to themselves and " their readers. That great man, whose clear and comprehensive understanding " appears even in his definitions, having frequent occasion to treat of such improper quantities, never fails to define them, so as to give a measure of them, either in " proper quantities, or such as had a known measure. See the definitions prefixed " to his Principia."

With these important remarks I entirely agree, excepting only the enumeration here given of the different kinds of proper quantity, which is liable to obvious and insurmountable objections. It appears to me that, according to Reid's own definition, extension is the only proper quantity within the circle of our knowledge. Duration is manifestly not measured by duration, in the same manner as a line is measured by a line; but by some regulated motion, as that of the hand of a clock, or of the shadow on a sun-dial. In this respect it is precisely on the same footing with velocities and forces, all of them being measured, in the last result, by extension. As to number and proportion, it might be easily shewn, that neither of them fall under the definition of quantity, in any sense of that word. In proof of this assertion (which may, at first sight seem somewhat paradoxical) I have only to refer to the mathematical lectures of Dr. Barrow, and to some very judicious observations introduced by Dr. Clarke in his controversy with Leibnitz. It is remarkable, that at the period when this essay was written, Dr. Reid should have been unacquainted with the speculations of these illustrious men on the same subject; but this detracts little from the merits of his memoir, which rest chiefly on the strictures it contains on the controversy between the Newtonians and Leibnitzians concerning the measure of forces.

Note (H.) p. 119.

The following view of the relation between the theorems of pure geometry and their practical applications strikes me as singularly happy and luminous; more especially the ingenious illustration borrowed from the science of geometry itself.

" Les vérités que la géométrie démontre sur l'étendue, sont des vérités purement " hypothétiques. Ces vérités cependant n'en sont pas moins utiles, en égard aux " conséquences pratiques qui en résultent. Il est aisé de la faire sentir par une " comparaison tirée de la géométrie même. On connoit dans cette science des lignes courbes qui doivent s'approcher continuellement d'une ligne droite, sans la " rencontrer jamais, et qui néanmoins, étant tracées sur le papier, se confondent " sensiblement avec cette ligne droite au bout d'un assez petit espace. Il en est de " même des propositions de géométrie; elles sont *la limite intellectuelle des vérités* " *physiques*, le terme dont celles-ci peuvent approcher aussi près qu'on le desire, " sans jamais y arriver exactement. Mais si les théorêmes mathématiques n'ont pas " rigoureusement lieu dans la nature, ils servent du moins à résoudre, avec une " précision suffisante pour la pratique, les différentes questions qu'on peut se proposer sur l'étendue. Dans l'univers il n'y a point de cercle parfait; mais plus " un cercle approchera de l'etre, plus il approchera des propriétés rigoureuses du " cercle parfait que la géométrie démontre; et il peut en approcher à un degré suffisant pour notre usage. Il en est de même des autres figures dont la géométrie " détaille les propriétés. Pour démontrer en toute rigueur, les vérités relatives à la " figure des corps, on est obligé de supposer dans cette figure une perfection arbitraire qui n'y sauroit être. En effet, si le cercle, par exemple, n'est pas supposé rigoureux, il faudra autant théorêmes différens sur le cercle qu'on imaginera de figures differentes plus ou moins approchantes du cercle parfait; et ces figures elles-mêmes pourront encore être absolument hypothétiques, et n'avoir point de modele existant dans la nature. Les lignes qu'on considere dans la géométrie usuelle, ne sont ni parfaitement droites, ni parfaitement courbes; les surfaces ne sont ni parfaitement planes, ni parfaitement curvilignes; mais il est nécessaire de les supposer telles, pour arriver à des vérités fixes et déterminées, dont on puisse faire ensuite l'application plus ou moins exacte aux lignes et aux surfaces physiques."*—D'Alembert, Elémens de Philosophie, Article *Géométrie*.

Note (I.) p. 129.

From some expressions in this quotation, it would seem that the writer considered it as now established by mathematical demonstration, not only that a provision is made for maintaining the order and the stability of the solar system; but that, after certain periods, all the changes arising from the mutual actions of the planets, begin again to be repeated over in an invariable and eternal *round*;—or rather, that all this is the result of the *necessary* properties of matter and of motion. So completely unfounded is this assumption, in point of fact, that the astronomical discovery in question affords not the slightest analogical presumption in favour of a *moral cycle*;—even on the supposition, that the actions of the human race, and the motions of the globe which they inhabit, were both equally subjected to the laws of mechanism.

I shall avail myself of this opportunity to remark further, that notwithstanding the lustre thrown by the result of La Grange's investigations on the metaphysical reasoning of Leibnitz against the *manus emendatrix* of Newton,—this reasoning, when we consider the vagueness of the abstract principles on which it rests, can be regarded in no other light than as a fortunate conjecture on a subject where he had neither experience nor analogy for a guide. The following argument is not ill stated by Voltaire; and, in my opinion, is more plausible than any thing alleged *a priori*, on the other side of the question, by Leibnitz. "Il est trop clair par l'expérience que Dieu a fait des machines pour être détruites. Nous sommes l'ouvrage de sa sagesse; et nous périssons. Pourquoi n'en seroit-il pas de même

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* [The truths which geometry demonstrates respecting extension, are truths wholly hypothetical. These truths, nevertheless, are not the less useful as to the practical consequences which result from them. It is easy to make this clear by an illustration drawn from geometry itself. We know there are in this science, curved lines, which must approach continually a right line without ever touching it; and which notwithstanding, when traced upon paper, evidently are confounded with this right line within a very small space. It is the same in geometrical propositions. They are *the intellectual limit of physical truths*; the term which they may approach as nearly as we choose without actually reaching it. But if mathematical theorems have, accurately speaking, no place in nature, they serve to resolve, with a precision sufficient for practice, the different questions which may be proposed respecting extension. In the universe there is no perfect circle, but the more exact any circle is, the more nearly does it approach the rigorous properties of that perfect circle, which is the subject of geometrical demonstration; and it may approach them near enough for our purposes. It is the same with other figures whose properties geometry investigates. To demonstrate rigourously truths relative to the figure of bodies, we are obliged to presuppose in this figure a perfection which does not exist. In fact, if the circle, for instance, is not supposed exact, there will be as many different theorems upon the circle which we suppose, as different figures more or less approaching the perfect circle; and these figures themselves may be absolutely hypothetical, and have no model in actual existence. The lines which we consider in common geometry, are neither perfectly straight, nor exactly curved; the surfaces are neither perfectly plane, nor exactly curvilinear; but it is necessary to suppose them so, to arrive at those fixed and determined truths, which we may afterwards apply with more or less exactness to the lines and surfaces of bodies.]

"du monde? Leibnitz veut que ce monde soit parfait; mais si Dieu ne l'a formé "que pour durer un certain tems, sa perfection consiste alors à ne durer que jusq' "à l'instant fixé pour sa dissolution."* Voltaire's Account of Newton's Philosophy.

For some excellent observations on these opposite conjectures of Leibnitz and of Newton, see Edinburgh Review, Vol. XIV. pp. 80, 81.

The quotation which gave occasion to the foregoing strictures induces me to add, before concluding this Note, that when we speak of La Grange's *Demonstration* of the Stability of the Solar System, it is by no means to be understood that he has proved, by mathematical reasoning, that this system never *will*, nor ever *can* come to an end. The amount of his truly sublime discovery is, that the system does *not*, as Newton imagined, contain within itself, like the workmanship of mortal hands, the elements of its own decay; and that, therefore, its final dissolution is to be looked for, not from the operation of physical causes subjected to the calculations of astronomers, but from the will of that Almighty Being, by whose *fiat* it was at first called into existence. That this stability is a *necessary* consequence of the general laws by which we find the system to be governed, may indeed, be assumed as a demonstrated proposition; but it must always be remembered, that *this necessity is only hypothetical or conditional*, being itself dependent on the continuance of laws, which may at pleasure be altered or suspended.

The whole of the argument in the text, on the permanence or stability of the order of nature, is manifestly to be understood with similar restrictions. It relates, not to necessary, but to probable truths; not to conclusions syllogistically deduced from abstract principles, but to *future contingencies*, which we are determined to *expect* by a fundamental law of belief, adapted to the present scene of our speculations and actions.

Note (K.) p. 132.

"The power of designating an individual object by an appropriate articulation, "is a necessary step in the formation of language, but very far removed indeed "from its consummation. Without the use of general signs, the speech of man "would differ little from that of brutes: and the transition to the general term "from the name of the individual is a difficulty which remains still to be surmounted. Condillac, indeed, proposes to shew, how this transition may be made in the "natural course of things. 'Un enfant appelle du nom *d'arbre* le premier arbre que "nous lui montrons. Un second arbre qu'il voit ensuite lui rappelle la même idée; "il lui donne le même nom; de même à un troisième, à un quatrième, et voilà le "mot *d'arbre*, donné d'abord à un individu, qui devient pour lui un nom be classe ou "de genre, une idée abstraite qui comprend tous les arbres en general.' In like "manner, Mr. Adam Smith, in his *Dissertation on the Origin of Languages*, and "Mr. Dugald Stewart, in his *Elements of the Philosophy of the Human Mind*, endeavour to explain this process, by representing those words which were originally used as the proper names of individuals, to be successively transferred to other "individuals, until at length each of them became insensibly the common name of "a multitude. This, however, is more ingenious than solid. The name given to "an individual, being intended exclusively to designate that individual, it is a direct subversion of its very nature and design, to apply it to any other individual, "known to be different from the former. The child, it is true, may give the name "of *father* to an individual like to the person it has been taught to call by that "name; but this is from mistake, not from design; from a confusion of the two "as the same person, and not from a perception of resemblance between them "whilst known to be different. In truth, they whose thoughts are occupied solely "about individual objects, must be the more careful to distinguish them from each "other; and accordingly, the child will most peremptorily retract the appellation

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* [It is too clear from experience, that God hath made the works of his hands to be destroyed. We are the product of his wisdom, and we perish. Why then may it not be so with the world? Leibnitz insists that this world is perfect; but if God formed it to endure only for a certain time, its perfection consists only in its lasting until the period appointed for its dissolution.]

"of *father*, so soon as the distinctness is observed.* The object with those whose "terms or signs refer only to individuals, must naturally be to take care, that "every such term or sign shall be applied to its appropriate individual, and to none "else. Resemblance can produce no other effect, than to enforce a greater cau-"tion in the application of the particular names, and therefore has no natural ten-"dency to lead the mind to the use of general terms." (Discourses and Dissertations on the Scriptural Doctrines of Atonement and Sacrifice. By William Magee, D. D. Senior Fellow of Trinity College, and Professor of Mathematics in the University of Dublin. Vol. II. pp. 63, 64. 3d edit.)

The observations in pp. 132, 133, &c. of this volume, (to which I must request the attention of my readers before they proceed to the following remarks) appear to me to weaken considerably the force of this reasoning, as far as it applies to the *substance* of the theory in question. With respect to Mr. Smith's illustration, drawn from the *accident* of a child's calling a stranger by the name of *father*, I readily acknowledge that it was unluckily chosen; and I perfectly assent to the strictures bestowed on it by Dr. Magee. In consequence of the habitual intercourse which this domestic relation naturally keeps up between the parties, the *mistake* of the child (as Dr. Magee very properly calls it) must, of course, be immediately corrected; and therefore, the example is of no use whatever in confirming the conclusion it is brought to support. It is to be regretted that, upon this occasion, Mr. Smith should not only have appealed to a period of infancy, when the notions of similarity and of identity, cannot fail to be sometimes one and the same; but should have assumed, as a general fact, an accidental occurrence, which, if it ever has happened, may be justly regarded as an exception to the usual history of the species. While yet on the breast, a child is able to distinguish with the utmost quickness and accuracy, between the face of an acquaintance and that of a stranger; and, when it is so far advanced, as to begin to utter articulate sounds, any tendency to transfer or to generalize the words *mother* or *nurse* seems scarcely conceivable. We are apt to suppose that the first attempts towards speech are coëval with the study of language; whereas the fact manifestly is, that these attempts are only the consequences of the progress previously and silently made in the interpretation of words. Long before this time, many of the logical difficulties which appear so puzzling to the speculative grammarian, have been completely surmounted.†

But although this particular example has been ill chosen, it does not therefore follow that the author's theory is altogether unfounded. Whoever has paid any attention to the phenomena of the infant mind, must be satisfied of its strong bias, in the first developement of the intellectual powers, to apply to similar objects a common name, without ever thinking of confounding them together.—Nor does this hold merely with respect to similar *objects*; it holds also (and at a surprisingly early period of life) with respect to similar *relations*. A child who has been accustomed to the constant attentions and caresses of its mother, when it sees another child in the arms of its nurse, will naturally and infallibly call the nurse the child's mother. In this instance, as in numberless others, its error arises from generalizing too hastily;—the distinction between the meanings of the two relative words Mother and

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* These remarks have a particular reference to the following sentence in Mr Smith's Dissertation: "A child that is just learning to speak, calls every person who comes to the house its *papa* or its *mama*; and thus bestows upon the whole species those names which it had been taught to apply to two individuals."

† The general fact with respect to children, assumed by Mr. Smith in the foregoing note, is stated still more strongly by Aristotle. Both of these philosophers have, I suspect, trusted more, in this instance, to theory than to observation. *Και τα παιδια το μεν πρωτον προσαγορευει παντας τους ανδρας, πατερας· και μητερας, τας γυναικας· ὑστερον δε διοριζει τουτων ἑκατερον.* "Ac pueri quoque primùm omnes viros appellant patres, et omnes mulieres, matres: postea vero discernunt horum utrumque." (Arist. Nat. Ausc. Lib. I. Cap. i.)

This passage (which I do not recollect to have seen quoted by any former writer) does honour to Aristotle's acuteness. The *fact*, indeed, asserted in it, is more than questionable; but, admitting the fact to be true, it must be owned that Aristotle has viewed it in a juster light than Mr. Smith;—not as an instance of any disposition to generalise proper names, but merely of imperfect and undistinguishing perception.

Nurse being too complex to be comprehended, till the power of observation begins to be exercised with some degree of attention and accuracy. This disposition, however, to transfer names from one thing to another, the diversity of which is obvious even to sense, certainly affords no inconsiderable an argument in favour of the opinion disputed by Dr. Magee.

It is indeed, wonderful, how readily children transfer or generalize the name of the *maternal relation* (*that* which of all others must necessarily impress their minds most strongly) not only in the case of their own species, but of the lower animals; applying with little or no aid from instruction, the word *mother* to the hen, the sheep, or the cow, whom they see employed in nurturing and cherishing their young.

To myself, I own, it appears, that the theory of Condillac and Smith on this point, is confirmed by every thing I have been able to observe of children. Even generic terms will be found, on examination, if I be not much deceived, to be originally understood by them merely as *proper names*; in so much that the notions annexed by an infant to the words denoting the different articles of its nursery-furniture, or the little toys collected for its amusement, are in its conceptions, as individually and exclusively appropriated, as the names of its father, mother, or nurse. If this observation be well-founded, the same gradual conversion of proper names into appellatives, which Mr. Smith supposes to have taken place in the formation of a language, is exemplified in the history of every infant while learning to interpret its mother-tongue. The case is nearly the same with the peasant, who has never seen but one town, one lake, or one river. All of these appellatives are to his ear pre-precisely equivalent to so many proper names.

"Quo te, Moeri, pedes? An, quo via ducit, in Urbem?"

That resemblance is one of our most powerful associating principles will not be disputed; and that, even in the maturity of our reason, we have a natural disposition to generalize the meaning of signs, in consequence of apprehended similarities, both of *things* and of *relations*, is equally certain. Why then should it be apprehended, that there is any peculiar mystery connected with this step in the commencement of the progress, when it seems to admit of an explanation so satisfactory, from a law of the human mind, exemplified daily in facts falling within the circle of our own experience?

Note (L.) page 146.

"Aristotle's rules are illustrated, or rather, in my opinion, *purposely darkened*, "by putting letters of the alphabet for the several terms." (Reid's Analysis of Aristotle's Logic.)

On this remark the following criticism has been made by Dr. Gillies.

"In the first Analytics, Aristotle shews, what is that arrangement of terms in "each proposition, and that arrangement of propositions in each syllogism, which "constitutes a necessary connexion between the premises and the conclusion. "When this connexion takes place, the syllogism is perfect in point of form; and "when the form is perfect, the conclusion necessarily follows from the premises, "whatever be the signification of the terms of which they are composed. These "terms, therefore, he commonly expresses by the letters of the alphabet, for the "purpose of shewing that our assent to the conclusion results, not from compar-"ing the things signified, but merely from considering the relation which the signs "(whether words or letters) bear to each other. Those, therefore, totally miscon-"ceive the meaning of Aristotle's logic, who think that by employing letters instead "of words, he has *darkened* the subject; since the more abstract and general his "signs are, they must be the better adapted to shew, that the inference results "from considering them alone, without at all regarding the things which they "signify."*

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* Analysis of Aristotle's Speculative Works, &c. by Dr. Gillies, Vol. I. p. 89, 2d edit. From a note at the foot of the page it appears, that the remarks just quoted from Reid gave occasion to the above strictures.

With the doctrine stated in the beginning of this extract I entirely agree. It coincides indeed remarkably with a passage in the former volume of this work, where I have shewn, at some length, that our assent to the conclusion of a legitimate syllogism results, not from comparing the things signified, but merely from considering the relations of the signs; and consequently, that letters of the alphabet might be substituted instead of verbal terms, without impairing the force of the argument. The observation appears to myself of considerable importance, when connected with the fundamental question *there* discussed, concerning the use of language as an instrument of thought; but, I own, I am at a loss to conceive how it should have been supposed to bear on the present subject. The only point at issue between Dr. Gillies and Dr. Reid is, whether the use of letters instead of words be, or be not, a useful expedient for facilitating the study of logic; and upon this, I apprehend, there can scarcely exist a diversity of opinion. No instance, I will venture to affirm, ever occurred of any hesitation in the mind of the merest novice about the conclusiveness of a legitimate syllogism, when illustrated by an example; but how difficult to explain to a person altogether unaccustomed to scholastic abstractions, the import and cogency of those symbolical demonstrations by which Aristotle has attempted to fortify the syllogistic theory!

The partiality of Dr. Gillies for this technical device has probably arisen, in part, from his supposing it to bear a much closer analogy than it does, in fact, to the algebraical art. Another very learned writer has proceeded on the same idea, when he observes, that "it should recommend the study of logic to mathematicians, "that, in order to make his *demonstrations* universal, Aristotle uses letters as universal characters, standing for all kinds of terms or propositions."* It would be an idle waste of words to shew, how very slight this analogy is, and how totally inapplicable to the question before us;—amounting to little more than this, that, in both cases, the alphabet happens to be employed as a substitute for common language. An analogy, much more in point, may be traced in the practice of designating by letters the different parties in a hypothetical law-suit;—a practice attended with no inconvenience, where these symbols only supply the place of proper names; but which would at once convert the simplest case into an aenigma, if they were to be employed (as they are by Aristotle) to denote, not merely individual existences, but the relations of general ideas.

While Dr. Gillies has thus exerted his ingenuity in defending the use made by Aristotle of letters instead of words, it is to be regretted, that he has said nothing about the motives which induced that philosopher, in disproving the illegitimate modes, to content himself with general references to such words as *bonum*, *habitus*, *prudentia*, upon which the student is left to his own judgment, in ringing the various changes necessary for the illustration of the theory. A more effectual contrivance could not easily have been thought of, for perplexing a subject, level, in itself, to the meanest capacity. In this respect, it answers the intended purpose still better than his alphabetical *formulae*.

Note (M.) page 165.

As instances of what are called by logicians *fallaciae in dictione*, a modern writer mentions the mistakes which may arise from confounding "*liber* Bacchus, et "*liber* a servitute; *liber* codex, et *liber* cortex; *crevi* à cerno, et *crevi* à cresco; "*infractus* participium ab *infringo*, et *infractus* compositum ab *in* et *fractus*, sensu "plane contrario."† He mentions also the danger of confounding the literal with the figurative sense of a word, as *vulpes* when applied to a quadruped, and to a man noted for cunning.—"Sic siquis arguat (he adds for the sake of illustration) "*stellam latrare, quia stella quædam Canis dicitur*, facile respondebitur captioso

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* Ancient Metaphysics, Vol. III. p. 51 of the Preface.

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† [*Liber*, the god of wine, *liber* free, *liber* a book, *liber* the bark of a tree; *crevi* from *cerno* to perceive, *crevi* from *cresco* to increase; *infractus*, the participle from *infringo*, and *infractus* compounded of *in* and *frango*; which words are taken in an opposite sense.]

"argumento, distinguendo varios sensus ejusdem vocis, indeque ostendendo syllogismi quatuor terminos (si sensum speetes) ubi tres saltem sono comparent."[*]

To exemplify the *fallacia accentus*, the same writer warns us against confounding *hortus* and *ortus; hara* and *ara; malum* adjectivum, and *malum* pro pomo; *cervus* and servus; *concilium* and consilium, &c. &c. The remedy against such fallacies, he gravely tells us, is to distinguish the words thus identified, so as to shew that the syllogism consists of more than three terms. "Solvuntur distinguendo ea quae confunduntur, indeque monstrando pluralitatem terminorum." He acknowledges, however, that fallacies of this sort are not likely to impose on a skilful logician. "Sed crassiores sunt hae fallaciae quam ut perito imponant."

I have purposely quoted these remarks, not from a mere schoolman, but from an author justly distinguished both by science and learning, Dr. Wallis of Oxford. They are taken, too, from a treatise written with the express view of adapting the logic commonly taught in our universities to the ordinary business of life; having a formal dedication prefixed to it, to the Royal Society of London, then recently instituted. The subject is the same with that of the third Book of Locke's Essay, relating to the *abuse of words;* and the interval between the two publications was only two years. Yet how immense the space by which they are separated in the history of the Human Mind!

The concluding paragraph, however, of this very puerile chapter on sophisms, bears marks of a mind fitted for higher undertakings. I cannot deny myself the pleasure of transcribing it, and of pointing it out to those who may hereafter speculate upon the theory of wit, as not unworthy of their attention.

"Interim hic monendum duco; quod hae *fallaciae*, utcunque justam argumenti vim non habeant, apprime tamen commodae sunt ad id omne quod *ingeniosum* vulgo dicimus: Ut sunt joci, facetiae, dicteria, scommata, sarcasmi, retorsiones lepidae, (*wit, raillery, repartee.*) Quippe hoc omne fundari solet in hujusmodi fallaciarum aliquâ. Nonnunquam allusio fit ad verborum sonos; nunc ad ambiguam vocum significationem; nunc ad dubiam syntaxin; nunc proverbialiter dici solita accommodantur sensu proprio, aut vice versa: nunc aliud aperte dicitur, aliud clam insinuatur; saltem oblique insinuatur, quod non erat directo dicendum; nunc verba contrario sensu captantur, et retorquentur; nunc verisimile insinuatur ut verum, saltem ut suspectum; nunc de uno dicitur, quod, mutato nomine, de alio intellectum vellent; nunc ironice laudando vituperant; nunc objecta spicula respondendo declinantur, aut etiam (obliquata) alio diriguntur, forte sic ut auctorem feriant; et fere semper ex ambigue luditur. Quae quidem fallaciarum formulae, si frigidae sint crassaeque, ridentur; si subtiliores, arrident: si acutae, titillant; si aculeatae, pungunt."[†]

Note (N.) page 178.

In the first volume of these Elements, I have endeavoured to trace the origin of that bias of the imagination, which has led men, in all ages of the world, to consider physical causes and effects as a series of successive events necessarily connected together, like the links of a metallic chain. (See Chap. i. Sect. 2.) So very strong is this bias, that, even in the present times, some of the most sagacious and cautious of Bacon's followers occasionally shew a disposition to relapse into the figurative language of the multitude. “The chain of natural causes (says Dr. Reid) has, not unfitly, been compared to a chain hanging down from heaven: A link that is discovered supports the links below it, but it must itself be supported; and that which supports it must be supported, until we come to the first link, which is supported by the throne of the Almighty.” (Essays on the Intellectual Powers, p. 115. 4to ed.) It is difficult to reconcile the approbation here bestowed on the above similitude, with the excellent and profound remarks on the relation of cause and effect, which occur in other parts of Dr. Reid's works. (See Essays on the Active Powers, p. 44, and pp. 286, 287, 288, 4to ed.)

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[*] [If any one contends, *that a star barks, because a certain star is called Canis, a dog;* his impertinent argument may easily be refuted by distinguishing the different senses of the same word, and then pointing out that there are *four* terms to the syllogism, if you consider the sense, though with regard to the sound only, we have but *three.*]

[†] [It is worth while to remark, that these *fallacies*, though of no force in argument, yet contribute very much to what we call *pleasantry;* such as jests, bonmots, wit, raillery, repartee. Sometimes the play is made upon the sound of words, sometimes upon their ambiguity of meaning or of syntax; what is commonly spoken proverbially, is applied with a particular meaning, or the contrary; now, one meaning is plainly expressed, and another insinuated, or, at least, that is obliquely insinuated which could not be directly asserted; now, what is said of one person is applied with some variation to another. Blame is conveyed by ironical praise, jests are avoided by a witty reply, or obliquely turned aside, so that they may hit another, and perhaps the author. And, indeed, pleasantry arises for the most part from ambiguous language. These forms of fallacies, if cold and without ingenuity, are derided; if ingenious, please; if shrewd, excite mirth; and if sarcastic, pierce and wound.]

Dr. Maclaurin, in the concluding chapter of his account of Newton's Discoveries, has still more explicitly lent the sanction of his name to this idea of a chain of second causes. “As we cannot but conceive the universe as depending on the first cause and chief mover, whom it would be absurd, not to say impious, to exclude from acting in it; so we have some hints of the manner in which he operates in nature, from the laws which we find established in it. Though he is the source of all efficacy, yet we find that place is left for *second causes*, to act in subordination to him; and mechanism has its share in carrying on the great scheme of nature. The establishing the equality of action and re-action, even in those powers which seem to surpass mechanism, and to be more immediately derived from him, seems to be an indication that those powers, while they derive their efficacy from him, are, however, in a certain degree, circumscribed and regulated in their operations by mechanical principles; and that they are not to be considered as *mere immediate volitions of his*, (as they are often represented,) but rather as instruments made by him, to perform the purposes for which he intended them. If, for example, the most noble phenomena in nature be produced by a rare elastic *aetherial medium*, as Sir Isaac Newton conjectured, the whole efficacy of this medium must be resolved into his power and will who is the supreme cause. This, however, does not hinder, but that the same medium may be subject to the like laws as other elastic fluids, in its actions and vibrations; and that, if its nature were better known to us, we might make curious and useful discoveries concerning its effects, from these laws. It is easy to see, that this conjecture no way derogates from the government and influences of the Deity; while it leaves us at liberty to pursue our inquiries concerning the nature and operations of such a medium: *Whereas they who hastily resolve these powers into immediate volitions of the Supreme Cause, without admitting any intermediate instruments, put an end to our inquiries at once; and deprive us of what is probably the most sublime part of philosophy, by representing it as imaginary and fictitious.*”

On the merits of this passage, considered in relation to the evidences of natural religion, I do not mean to offer any remarks here. Some acute strictures upon it in this point of view (but expressed with a most unbecoming and offensive petulance) may be found in the third volume of Baxter's Inquiry into the Human Soul.—It is with the *logical* proposition alone, stated in the concluding sentence, that we are concerned at present; and *this* (although Baxter has passed it over without any animadversion) appears to me highly exceptionable; proceeding on a very inaccurate, or rather totally erroneous conception of the object and aim of physical science. From the sequel of the section to which this note refers, (particularly from pages 255, 256, 257, 258,) I trust it will appear, that supposing all the phenomena of the universe to be produced by *the immediate volitions of the Supreme Cause*, the business of natural philosophers would be precisely the same as upon the hypothesis adopted by Maclaurin: the investigation of the *necessary connexions* linking together physical causes and effect (if any such necessary connexions *do* exist) being confessedly placed beyond the reach of our faculties; and, of consequence, our most successful researches terminating in the discovery of some general law, or in the farther generalization and simplification of laws already known. In this intellectual process there is no more reason to apprehend that any limit is fixed to our inquiries, than that the future progress of geometry should be stopped by the discovery of some one truth comprising the whole science in a single theorem.

Nor do I apprehend that the theory which excludes from the universe *mechanism* (strictly so called) tends, in the smallest degree, to detract from its beauty and grandeur; notwithstanding the popular and much admired argument of Mr. Boyle in support of this idea. "As it more recommends (he observes) the skill of an engineer to contrive an elaborate engine, so as that there need nothing to reach his ends in it, but the contrivance of parts void of understanding; than if it were necessary that, ever and anon, a discreet servant should be employed to concur notably to the operations of this or that part, or to hinder the engine from being out of order: so it more sets off the wisdom of God, in the fabric of the universe, that he can make so vast a machine perform all those many things which he designed it should, by the mere contrivance of brute-matter, managed by certain laws of motion, and upheld by his ordinary and general concourse; than if he employed, from time to time, an intelligent overseer to regulate and control the motion of the parts."[*]—"What may be the opinion of others (says Lord Kames, after quoting the foregoing passage) I cannot say; but to me this argument is perfectly conclusive. Considering this universe as a great machine, the workmanship of an intelligent cause, I cannot avoid thinking it the more complete, the less mending or interposition it requires. The perfection of every piece of workmanship, human and divine, consists in its answering the designed purpose, without bestowing further labour upon it."[†]—To myself, I must confess, Mr. Boyle's argument appears altogether unworthy of its author. The avowed use of a *machine* is to save labour; and therefore, the less frequently the interposition of the artist is necessary, the more completely does the machine accomplish the purpose for which it was made. These ideas surely do not apply to the works of the Almighty. The multiplicity of his operations neither distract his attention, nor exhaust his power; nor can we, without an obvious inconsistency in the very terms of the proposition, suppose him reduced to the necessity of economizing, by means of mechanism, the resources of Omnipotence.[‡]

My object in these observations (I think it proper once more to remind my readers) is not to prejudge the metaphysical question between Maclaurin and Baxter; but merely to establish the two following propositions. 1. That this question is altogether foreign to the principles which form the basis of the inductive logic; these principles neither affirming nor denying the existence of necessary connexions between physical causes and effects, but only asserting, that such connexions, if they do exist, are not objects of human knowledge. 2. That no presumption in favour of their existence is afforded by Mr. Boyle's similitude; the reasoning founded on the supposed analogy between the universe and a machine, being manifestly inapplicable where the *power* as well as the *skill* of the Contriver is admitted to be infinite.—If the remarks offered on these points be well founded, they may serve, at the same time, to shew that the attempt made in the text, to illustrate some abstract topics connected with the received Rules of Philosophizing was not altogether superfluous.

The metaphysical doctrine maintained by Baxter in opposition to Maclaurin, seems to coincide nearly with Malebranche's Theory of *Occasional Causes*, as well as with the theology of the old Orphic verses quoted in the 7th chapter of Aristotle's Treatise *de Mundo*.—A very striking resemblance is observable between these verses, and the Hymn to Narrayna or the Spirit of God, translated by Sir William Jones from the writings of ancient Hindu Poets.[§]

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[*] Inquiry into the vulgar notion of Nature.

[†] Of the laws of Motion. Published in the First Volume of the Physical and Literary Essays, read before the Edinburgh Philosophical Society, (1754.)

[‡] A comparison still more absurd than that of Mr. Boyle occurs in the 6th Chapter of Aristotle's book *de Mundo*; where he represents it as unbecoming the *dignity* of the Supreme Being *αυτουργειν απαντα*,—"to put his own hand to every thing;" a supposition, according to him, "much more unsuitable to the divine majesty, than to conceive a great monarch like Xerxes taking upon himself the actual execution of all his own decrees."

[§] The same opinion is explicitly avowed by Dr. Clarke, a zealous partisan of the Experimental Philosophy, and one of the ablest logicians that the Newtonian school has hitherto produced. "The course of nature, truly and properly speaking, is nothing but the will of God, *producing certain effects, in a continued, regular, constant, and uniform manner.*" (Clarke's Works, Vol. II. p. 698. Fol. edit.)

Note (O.) page 188.

Although Dr. Reid was plainly led into this train of thinking by Mr. Hume, the same doctrine, with respect to the relation of *cause* and *effect*, (considered as the object of physical science,) is to be found in many English writers of a far earlier date. Of this assertion I have produced various proofs in my first Volume, from Hobbes, Barrow, Berkeley, and others, to whose speculations on this head Dr. Reid does not seem to have paid any attention. To these quotations I beg leave to add the following, from a book, of which the *third* edition was published in 1737.

"Here it is worth observing, that all the real true knowledge we have of nature is "entirely *experimental;* in so much, that how strange soever the assertion seems, "we may lay this down as the first fundamental unerring rule in physics, *that it is* "*not within the compass of human understanding, to assign a purely speculative* "*reason for any one phenomenon in nature;* as why grass is green, or snow is "white; why fire burns, or cold congeals. By a *speculative reason*, I mean assigning an immediate *efficient cause a priori*, together with the manner of its operation, for any effect whatsoever purely natural. We find, indeed, by observation and experience, that such and such effects *are* produced; but when we attempt to think of the reason *why*, and the manner *how* the causes work those effects, then we are at a stand, and all our reasoning is precarious, or at best but "probable conjecture.

"If any man is surprized at this, let him instance, in some speculative reason he "can give for any natural phenomenon; and how plausible soever it appears to "him at first, he will, upon weighing it thoroughly, find it at last resolved into "nothing more than mere observation and experiment, and will perceive that these "expressions generally used to describe the *cause* or manner of the productions of "nature, do really signify nothing more than the *effects*." "*The Procedure, Extents, and Limits of Human Understanding.*" Ascribed to Dr. Peter Brown, Bishop of Cork. (London, 1737, 3d ed.)

For the following very curious extracts, (together with many others of a similar import, both from English and from foreign writers,) I am indebted to a learned correspondent, William Dickson, LL. D., a gentleman well known by his able and meritorious exertions for the abolition of the slave trade.

"Confidence of *science* is one great reason we miss it; for on this account presuming we have it every where, we seek it not where it is; and therefore fall "short of the object of our inquiry. Now, to give further check to *dogmatical* "pretensions, and to discover the vanity of assuming ignorance, we'll make a short "inquiry, whether there be any such thing as *science* in the sense of its assertors. "In their notion, then, *it is the knowledge of things in their true, immediate, necessary causes:* Upon this I'll advance the following observations.

"1. All knowledge of causes is deductive; for we know none by simple intuition, but through the mediation of their effects. So that we cannot conclude any "thing to be the cause of another, but from its continual accompanying it; for "the causality itself is insensible. But now to argue from a concomitancy to a "causality is not infallibly conclusive; yea, in this way lies notorious delusion, "&c. &c. &c.

"2. We hold no *demonstration* in the notion of the dogmatist, but where the "contrary is impossible:" &c. &c. (*Scepsis Scientifica:* or Confess't Ignorance the Way to Science; in an Essay of the Vanity of Dogmatizing and Confident Opinion; with a Reply to the Exceptions of the learned *Thomas Albius.*[*] By Joseph Glanvill, M. A. London, 1665. Dedicated to the Royal Society.)

"*Causalities* are first found out by *concomitancy*, as I intimated. And our experience of the dependence of one, and independence of the other, shews which is "the effect, and which the cause. Definitions cannot discover causalities, for they "are formed after the causality is known. So that, in our author's instance, a "man cannot know heat to be the atoms of fire, till the concomitancy be known,

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[*] Or *White*, a Roman priest, author of a treatise entitled *Sciri, sive Sceptices et Scepticorum a jure Disputationis Exclusio.* (See Biog. Diction.)

" and the efficiency first presumed. The question is, then, How *heat* is known to " be the effect of *fire?* Our author answers by its definition. But how came it to " be so defined? The answer must be, by the concomitancy and dependence, for " there's nothing else assignable."—(SCIR$^{E}_{I}$ tuum nihil est; or the Author's Defence of the Vanity of Dogmatizing against the Exceptions of the learned *Thomas Abius*, in his late SCIRI.) London, 1665.

" Inter causam propriè dictam et effectum oportet esse necessarium nexum; " adeo ut positâ actione causae sequatur necessario effectus. Cum Deus vult ali" quid efficere, id necessario eveniat oportet, &c. Quia autem ejusmodi nexus " non cernitur inter causas creatas et effectus, nonnulli causas secundas, " seu creatas, suâ vi agere negarunt. Negant corpora a corporibus moveri, " quod inter motum corporis, et motum eorum in quae incidit, nullus depre" hendatur nexus, adeo ut moto corpore A, necesse sit moveri corpus B, cui " colliditur. Iidem quoque negant corpora a spiritibus moveri, quia inter vo" luntatem spirituum et motum corporum nullam connexionem animadvertunt, " &c. Fatendum a nobis hujus modi connexum nullum cerni, nec sequi ex eo " quod, corpore moto, id, in quod incidit, movetur; aut ex eo quod, mente, vo" lente, corpus agitatur, corpora et mentem esse veras motus causas. Fieri posset, " ut occasiones tantum essent, quibus positis, alia causa ageret. Verum uti, ex " ejusmodi possibilitate, non colligeris rem ita se habere; ita ne eô quod non adse" queris aliquid, consequens est ut nihil sit; nisi aliunde probaveris tibi esse " earum rerum, de quibus agitur, adaequatam ideam, aut rem repugnare, &c.—Pos" sunt inesse corporibus motis, et spiritibus, facultates ignotae, de quibus judicium " nullum, aut negando aut affirmando, ferre possumus. Itaque ex aequo peccant, " qui affirmant inesse iis certô facultates efficiendorum quorundam, quae an ab iis " fiant ignorant; et qui negant quidquam inesse corporibus et spiritibus, nisi quod " in iis perspicue norunt."[*]—Joannis Clerici Opera Philosophica. Amstel. 1698. Ontol. T. I. p. 376.

After this cloud of authorities, (many of which are from books in very general circulation,) it is surprising that the following sentence should have escaped the pen of Dr. Beattie. " The sea *has* ebbed and flowed twice every day, in time past; " therefore the sea *will continue* to ebb and flow twice every day in time to come, " —isby no means a logical deduction of a conclusion from premises.—THIS RE" MARK WAS FIRST MADE BY MR. HUME." Essay on Truth, 2d ed. p. 126.

It is evident, that this remark is only a particular application of the doctrine contained in the above quotations; as well as in the numerous extracts to the same purpose, collected in Note (C.) at the end of the first Volume of this Work. In one of these (from Hobbes) the very same observation is made; and a sort of theory is proposed to explain *how* the mind is thus led to infer the *future* from the *past*;—a theory which, however unsatisfactory for its avowed purpose, is yet sufficient to shew, that the author was fully aware, that our expectation of the continuance of the laws of nature was a fact not to be accounted for from the received principles of the scholastic philosophy.

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[*] [Between a cause, properly so called, and its effect, there must be a necessary connexion. When God wills to produce, the effect must happen. But as connexion in this sense is not seen between created causes and effects, some philosophers deny that second or created causes have any efficient power. They deny that bodies can be said to move each other, because between the motion of a body and the motion of other bodies against which it strikes, there is no necessary connexion; so that when the body A moves, the body B, against which it strikes, is necessarily moved. These persons also deny that body can be moved by spirit, because between the volitions of spirits and the motion of bodies they perceive no connexion. We must confess, that no connexion, in this sense, can be perceived, and it does not follow, when a body is moved, that against which it infringes is also moved; or, that because, when the mind wills, the body moves, that, therefore, that body or this mind is the cause of motion. It is possible they may be only occasions, which being supposed, other causes act. But as from the possibility of this, you cannot infer that it is so; so neither can you infer, that because you cannot detect it, therefore, no cause exists; unless you also prove that you have a perfect comprehension of the propositions of which you treat, or that the thing is impossible, &c. For there may exist in bodies moved, and in spirits, faculties unknown to us, and of which we can neither affirm nor deny any thing. Those, therefore, who assert, that these are able to produce effects, of which effects they yet know nothing; and those, who deny that any thing exists either in spirit or in body, which they do not perfectly comprehend, are equally in errour.]

Note (P.) page 290.

From the Preface of Pappus Alexandrinus to the Seventh Book of his Mathematical Collection. (See Halley's Version and Restitution of Apollonius Pergaeus de Sectione Rationis et Spatii, p. xxviii.)

. . . . "Resolutio est methodus, quâ à quaesito quasi jam concesso per ea "quae deinde consequuntur, ad conclusionem aliquam, cujus ope Compositio fiat, "perducamur. In resolutione enim, quod quaeritur ut jam factum supponentes, "ex quo antecedente hoc consequatur expendimus: iterumque quodnam fuerit hu"jus antecedens; atque ita deinceps, usque dum in hunc modum regredientes, in "aliquid jam cognitum locoque principii habitum incidamus. Atque hic processus "Analysis vocatur, quasi dicas, inversa solutio. E contrario autem in Composi"tione, cognitum illud, in Resolutione ultimo loco acquisitum ut jam factum prae"mittentes; et quae ibi consequentia erant, hic ut antecedentia naturali ordine "disponentes, atque inter se conferentes, tandem ad Constructionem quaesiti perve"nimus. Hoc autem vocamus Synthesin. Duplex autem est Analyseos genus, vel "enim est veri indagatrix, diciturque Theoretica; vel propositi investigatrix, ac "Problematica vocatur. In Theoretico autem genere, quod quaeritur, revera ita "se habere supponentes, ac deinde per ea quae consequuntur, quasi vera sint (ut "sunt ex hypothesi) argumentantes; ad evidentem aliquam conclusionem proce"dimus. Jam si conclusio illa vera sit, vera quoque est propositio de qua quaeri"tur; ac demonstratio reciproce respondet analysi. Si vero in falsam conclu"sionem incidamus, falsum quoque erit de quo quaeritur.* In Problematico vero "genere, quod proponitur ut jam cognitum sistentes per ea quae exinde consequun"tur tanquam vera, perducimur ad conclusionem aliquam: quod si conclusio illa "possibilis sit ac ποριστον, quod Mathematici *Datum* appellant; possibile quoque "erit quod proponitur: et hic quoque demonstratio reciproce respondebit Analysi. "Si vero incidamus in conclusionem, impossibilem, erit etiam problema impossi"bile. Diorismus autem, sive determinatio, est qua discernitur quibus conditioni"bus quotque modis problema effici possit. Atque haec de Resolutione et Compo"sitione dicta sunto."†

* From the account given in the text of *Theoretical Analysis*, it would seem to follow, that its advantages, as a method of investigation, increase in proportion to the variety of demonstrations of which a theorem admits; and that, in the case of a theorem admitting of one demonstration alone, the two methods would be exactly on a level. The justness of this conclusion will, I believe, be found to correspond with the experience of every person conversant with the process of the Greek geometry.

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† [*Resolution* is the method by which, by taking for granted the thing sought, and pursuing the consequences which would follow from this assumption, we are led to some conclusion, by which a *Composition* may be effected. In *Resolution*, by supposing what we seek already given, we consider what can be the antecedent from which this consequence is drawn? and again, what is its antecedent? so that by going thus backwards, we at length hit upon something which is already known, and which may serve us as a principle. This process is termed *Analysis*, that is, *an inverse solution*. On the other hand, in *Composition*, assuming as given, that known principle which in Resolution we have just discovered, what were there consequents, here disposing in their natural order as antecedents, and comparing them together, we come at length to the *construction* of things sought. This we term *Synthesis*. Of Analysis there are two kinds. It is an inquiry after a truth, and is called *Theoretical*, or an investigation of a proposition, and termed *Problematical*. In the Theoretical Analysis, what is sought we presuppose true, and then arguing through its consequences as if true (which they are by hypothesis) we reach some

Note (Q.) page 219.

The following passage from Buffon, although strongly marked with the author's characteristical spirit of system, is yet, I presume, sufficiently correct in the outline, to justify me for giving it a place in this note, as an illustration of what I have said in the text on the insensible gradations which fix the limits between resemblance and analogy.

" Take the skeleton of a man; incline the bones of the pelvis; shorten those of " the thighs, legs, and arms; join the *phalanges* of the fingers and toes; lengthen " the jaws by shortening the frontal bones; and lastly, extend the spine of the back. " This skeleton would no longer represent that of a man; it would be the skeleton " of a horse. For, by lengthening the back-bone and the jaws, the number of the " vertebrae, ribs, and teeth, would be increased; and it is only by the numbers of " these bones, and by the prolongation, contraction and junction of others, that " the skeleton of a horse differs from that of a man. The ribs, which are essential " to the figure of animals, are found equally in man, in quadrupeds, in birds, in " fishes, and even in the turtle. The foot of the horse, so apparently different " from the hand of a man, is composed of similar bones, and at the extremity of " each finger, we have the same small bone resembling the shoe of a horse which " bounds the foot of that animal. Raise the skeletons of quadrupeds, from the ape " kind to the mouse, upon their hind-legs, and compare them with the skeleton of a " man; the mind will be instantly struck with the uniformity of structure observed " in the formation of the whole group. This uniformity is so constant, and the " gradations from one species to another are so imperceptible, that, to discover the " marks of their discrimination, requires the most minute attention. Even the bones " of the tail will make but a slight impression on the observer. The tail is only a " prolongation of the os coccygis or rump-bone, which is short in man. The ouran " outang and true apes have no tail, and in the baboon and several other quadrupeds, " its length is very inconsiderable. Thus, in the creation of animals, the Supreme " Being seems to have employed only one great idea, and, at the same time, to have " diversified it in every possible manner, that men might have an opportunity of " admiring equally the magnificence of the execution, and the simplicity of the de- " sign." (Smellie's Translation.)

As a proof that the general conclusion in which the foregoing extract terminates, requires some important qualifications and restrictions, it is sufficient to subjoin a few remarks from a later writer, who, with the comprehensive views of Buffon, has combined a far greater degree of caution and correctness in his scientific details.

. . . . . . " It has been supposed by certain naturalists, that all beings " may be placed in a series or scale, beginning with the most perfect, and termi- " nating in the most simple, or in the one which possesses qualities the least nu- " merous and most common, so that the mind, in passing along the scale from one " being to another, shall be no where conscious of any chasm or interval, but pro- " ceed by gradations almost insensible. In reality, while we confine our atten- " tion within certain limits, and especially while we consider the organ separately, " and trace them through animals of the same class only, we find them proceed in " their degradation, in the most uniform and regular manner, and often perceive a " part, or vestige of a part, in animals where it is of no use, and where it seems to " have been left by Nature, only that she might not transgress her general law of " continuity.

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evident conclusion. Now, if this conclusion is true, the proposition concerning which we inquire is also true, and the demonstration answers reciprocally to the analysis; but if we light upon a false conclusion, we infer the assumption to be false. In the *Problematical Analysis*, on the contrary, assuming what is sought as already *given*, we are carried by consequences, legitimately drawn, to some conclusion. If this conclusion be possible, and what the Mathematicians call a *Porism* or *Datum*, what is proposed will also be possible; and here also the demonstration will reciprocally answer to the analysis; but if we fall upon an impossible conclusion, the problem also will be impossible. A *Diorismus* or *Determination*, is that by which we are enabled to *determine* on what conditions and in how many modes a Problem may be solved. Thus much of Resolution and Composition.]

"But, on the one hand, all the organs do not follow the same order in their de- " gradation. *This* organ is at its highest state of perfection in one species of ani- " mals; *that* organ is most perfect in a different species, so that, if the species are " to be arranged after each particular organ, there must be as many scales or se- " ries formed, as there are regulating organs assumed; and in order to construct a " general scale of perfection, applicable to all beings, there must be a calculation " made of the effect resulting from each particular combination of organs,—a cal- " culation which, it is needless to add, is hardly practicable.

" On the other hand, these slight shades of difference, these insensible gradations, " continue to be observed, only while we confine ourselves to the same combina- " tions of leading organs; only while we direct our attention to the same great " central springs. Within these boundaries all animals appear to be formed on " one common plan, which serves as the ground work to all the lesser internal " modifications; but the instant we pass to animals where the leading combina- " tions are different, the whole of the resemblance ceases at once, and we cannot " but be conscious of the abruptness of the transition.

" Whatever separate arrangements may be suitable for the two great classes of " animals, with and without vertebrae, it will be impossible to place at the end of " the one series, and at the commencement of the other, two animals sufficiently re- " sembling, to form a proper bond of connexion." Introduction to *Cuvier's Leçons d'Anatomie Comparée.*

Note (R.) p. 227.

Of fortunate conjectures or hypotheses concerning the laws of nature, many ad- additional examples might be produced from the scientific history of the 18th century. Franklin's sagacious and confident anticipation of the identity of lightning and of electricity is one of the most remarkable. The various analogies previously remarked between their respective phenomena had become, at this period, so striking to philosophers, that the decisive experiment necessary to complete the theory, was carried into execution, in the course of the same month, on both sides of the Atlantic. In the circumstantial details recorded of that made in America, there is something peculiarly interesting. I transcribe them in the words of Dr. Priestley, who assures us that he received them from the best authority.

" After Franklin had published his method of verifying his hypothesis concern- " ing the sameness of electricity with the matter of lightning, he was waiting for " the erection of a spire in Philadelphia to carry his views into execution; not " imagining that a pointed rod, of a moderate height, could answer the purpose; " when it occurred to him that, by means of a common kite, he could have a " readier and better access to the regions of thunder, than by any spire whatever. " Preparing, therefore, a large silk handkerchief, and two cross sticks of a proper " length, on which to extend it, he took the opportunity of the first approaching " thunder-storm to take a walk into a field, in which there was a shed convenient " for his purpose. But dreading the ridicule which too commonly attends unsuc- " cessful attempts in science, he communicated his intended experiment to nobody " but his son, who assisted him in raising the kite.

" The kite being raised, a considerable time elapsed before there was any appear- " ance of its being electrified. One very promising cloud had passed over it with- " out any effect; when, at length just as he was beginning to despair of his contri- " vance, he observed some loose threads of the hempen string to stand erect, and to " avoid one another, just as if they had been suspended on a common conductor. " Struck with this promising appearance, he immediately presented his knuckle to " the key, and (let the reader judge of the exquisite pleasure he must have felt at " that moment) the discovery was complete. He perceived a very evident electric " spark. Others succeeded even before the string was wet, so as to put the matter " past all dispute; and when the rain had wet the string, he collected electric fire " very copiously. This happened in June 1752, a month after the electricians " in France had verified the same theory, but before he heard of any thing they " had done."

Priestley's History of Electricity, pp. 180, 181, 4to ed.

Note (S.) page 231.

“ Natural knowledge may not unaptly be compared to a vegetable, whether plant or tree, which springs from a seed sowed in a soil proper, and adapted by a skilful gardener, for that plant. For as the seed, by small fibrills or roots it shoots out, receives from the soil or earth a nourishment proper and adapted for ascending into the body or stalk, to make it grow in bulk and strength to shoot upwards, and from thence to shoot forth branches, and from them leaves, thereby to draw and receive out of the air a more refined, spirituous, and enlivening juice, which, descending back into the body or stalk, increases its stature, bulk circumference, and strength, by new encirclings, and thereby enables it to send forth more fibrills and greater roots, which afford greater and more plentiful supplies to the stock or trunk, and enable that to exert and shoot forth more branchings, and greater numbers of leaves; which, repeating all the effects and operations by continued and constant circulations, at length bring the plant to its full stature and perfection.

“ So natural knowledge doth receive its first informations from the supplies afforded by select and proper phenomena of nature conveyed by the senses; these improve the understanding, and enable it to raise some branchings out into conclusions, corollaries, and maxims; these afford a nutritive and strengthening power to the understanding, and enable it to put forth new roots of inquisition, trials, observations, and experiments, and thereby to draw new supplies of information: which further strengthening the understanding, enable it to exert and produce new deductions and new axioms; These circulate and descend downwards, increasing and strengthening the judgment, and thereby enable it to make more striking out of roots of inquiries and experiments, which cause the like effects as before, but more powerfully, and so by constant and continued circulations from phenomena to make deductions, and from deductions to inquire phenomena, it brings the understanding to a complete and perfect comprehension of the matter at first proposed to be considered.” (Hook’s Posthumous Works, p. 553.)

Note (T.) page 232.

“ Aliquando observationes et experimenta immediate nobis exhibent principia, quae quaerimus; sed aliquando etiam *hypotheses* in auxilium vocamus, non tamen penitus arbitrarias, sed conformes iis quae observantur, et quae, supplentes immediatarum observationum defectum, viam investigationi sternunt, tanquam divinantibus; ut si ea, quæ ex ipsis deducuntur, inveniamus re ipsa, eadem retineamus, et progrediamur ad nova consectaria; secus vero, ipsas rejiciamus. Et quidem plerumque hanc esse arbitror methodum omnium aptissimam in physica, quae saepissime est velut quaedam enucleatio epistolae arcanis notis conscriptæ, ubi per attentationem, et per errores etiam plurimos paulatim et caute progrediendo, ad veram ejus theoriam devenitur: cujus rei specimen admodum luculentem exhibui in mea dissertatione de lumine, agens de rectilinea luminis propagatione; ac in Stayanae Philosophiae Tomo I., agens de generalibus proprietatibus corporum, et de vi inertiae in primis; Tomo vero II. agens de totius Astronomiae constitutione.”* Boscovich de Solis ac Lunae Defectibus.

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* [Sometimes observations and experiments exhibit to us directly the principles which we seek, but sometimes also we call *hypotheses* to our aid; not, however, those which are wholly arbitrary, but such as are conformable to observations already made, and which, supplying the deficiency of direct observations, facilitate, by a kind of prophetical aid, the path of investigation. If we find the conclusions drawn from these to be founded in truth, we adopt them, and go on to fresh inquiries; if not, we reject the hypotheses themselves. And truly I think this method for the most part the best suited to the investigation of physics. It resembles the interpretation of a letter written in cyphers, in which case, by frequent trials, and by cautiously choosing our path amid numerous mistakes, we come at last to the true key. Of this method I have exhibited a beautiful specimen in my dissertation

In Sprat's History of the Royal Society, a similar idea occurs, illustrated by an image equally fanciful and apposite. "It is not to be questioned, but many inventions of great moment have been brought forth by authors, who began upon suppositions, which afterwards they found to be untrue. And it frequently happens to philosophers, as it did to Columbus; who first believed the *clouds* that hovered about the continent to be the firm *land*: But this mistake was happy; for, by sailing towards them, he was led to what he sought; so by prosecuting of mistaken causes, with a resolution of not giving over the pursuit, they have been guided to the truth itself."

[The work from which this passage is taken (it may be here remarked by the way,) affords complete evidence of the share which, in the judgment of the founders of the Royal Society, Bacon had in giving a beginning to Experimental pursuits in England. See, in particular, Section xvi.]

Note (U.) page 233.

With respect to the application of the method of *exclusions* to physics, an important logical remark is made by Newton, in one of his letters to Mr. Oldenburgh. Obvious and trivial as it may appear to some, it has been overlooked by various writers of great name; and therefore I think proper to state it in Newton's own words.

"In the mean while, give me leave, Sir, to insinuate, that I cannot think it effectual for determining truth, to examine the several ways by which phenomena may be explained, *unless where there can be a perfect enumeration of all these ways.* You know the proper method for inquiring after the properties of things, is to deduce them from experiments. And I told you, that the theory which I propounded (concerning light and colours) was evinced to me, not by *inferring it is thus, because it is not otherwise;* that is, not by deducing it only from a confutation of contrary suppositions, but by deriving it from experiments concluding positively and directly. The way, therefore, to examine it is, by considering whether the experiments which I propound, do prove those parts of the theory to which they are applied; or by prosecuting other experiments which the theory may suggest for its examination," &c. &c. Horsley's Edition of Newton's Works, Vol. IV. p. 320.

Note (X.) page 236.

"If we consider the infantine state of our knowledge concerning vision, light, and colours, about a century ago, very great advancements will appear to have been made in this branch of science; and yet a philosopher of the present age has more *desiderata*, can start more difficulties, and propose more new subjects of inquiry, than even Alhazen or Lord Bacon. The reason is, that whenever a new property of any substance is discovered, it appears to have connexions with other properties, and other things, of which we could have no idea at all before, and which are by this means but imperfectly announced to us. Indeed, *every doubt* implies some degree of *knowledge;* and while nature is a field of such amazing, perhaps boundless extent, it may be expected that the more knowledge we gain, the more doubts and difficulties we shall have; but still, since every advance in knowledge is a real and valuable acquisition to mankind, in consequence of its enabling us to apply the powers of nature to render our situation in life more happy, we have reason to rejoice at every new difficulty that is started, because it informs us that more knowledge, and more advantage are yet unattained, and should serve to quicken our diligence in the pursuit of them. Every *desideratum* is an imperfect *discovery.*"—*Priestley's History of Discoveries relating to Vision, Light, and Colours,* p. 773. (Lond. 1772.)

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on Light, and in the first volume of the Stayan Philosophy, where I treat of the general properties of bodies, and especially of their vis inertiæ; also in the second volume, of the whole science of Astronomy.]

Note (Y.) page 244.

For the analogies between Galvanism and Electricity, see *Traité Elémentaire de Physique, par M. L'Abbé Haüy*, § 717.—The passage concludes with the following remark, which may be regarded as an additional proof, that, even when analogical conjectures appear to depart the most widely from the evidence of experience, it is from experience that they derive their whole authority over the belief. "Partout "le fluide électrique semble se multiplier par la diversité des phenomenes; et il "nous avait tellement accoutumés à ses métamorphoses, que la nouveauté même "de la forme sous laquelle il s'offrait dans le Galvanisme naissant, semblait être "une raison de plus pour le reconnaître."[*]

Note (Z.) page 251.

In that branch of politics which relates to the theory of Government, one source of errour (not unfrequently overlooked by the advocates for experience) arises from the vagueness of the language in which political facts are necessarily stated by the most faithful and correct historians. No better instance of this can be produced than the terms Monarchy, Aristocracy, and Democracy, commonly employed to distinguish different forms of Government from each other. These words, in their strict philosophical acceptation, obviously denote not *actual* but *ideal* constitutions, existing only in the imagination of the political theorist; while, in more popular discourse, they are used to discriminate, according to their prevailing bias or spirit, the various mixed establishments exemplified in the history of human affairs. Polybius, accordingly, with his usual discernment, expresses his doubts, under which of the three simple forms the constitution of Rome, at the period when he had an opportunity of studying it, ought to be classed. "When we "contemplate (he observes) the power of the Consuls, it seems to be a monarchy; "when we attend to the power of the Senate, it seems to be an aristocracy; when "we attend to the power of the People, we are ready to pronounce it a demo-"cracy."[†]

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[*] [Every where the Electrical fluid seems to multiply itself by the diversity of its phenomena, and we are so accustomed to its changes that the novelty of the form under which it appears in nascent galvanism, seems to supply an additional reason for recognizing it as the same fluid.]

[†] This observation of Polybius has been unjustly censured by Grotius. "Sed neque Polybii hic utor auctoritate, qui ad mixtum genus reipublicae refert Romanam rempublicam, quae illo tempore, si non *actiones ipsas*, sed *jus agendi* respicimus, mere fuit popularis: Nam et senatus auctoritas, quam ad optimatum regimen refert, et consulum, quos quasi reges fuisse vult, subdita erat populo. Idem de aliorum politica scribentium sententiis dictum volo, qui magis externam speciem et quotidianam administrationem, quam jus ipsum summi imperii spectare congruens ducunt suo instituto."[‡] (De Jure Belli ac Pacis, Lib. 1 Cap. 3.) In reply to this criticism it is sufficient to remark, that Polybius is not here speaking of the *theory* of the Roman constitution, (about which there could be no diversity of opinion,) but of what common observers are so apt to overlook,—*the actual state of that constitution*, modified as it was by time, and chance, and experience.—Among the numerous commentators on Grotius, I recollect one only (Henry de Cocceii) who has viewed this question in its proper light. "Auctor inter eos, qui circa formas imperii falluntur etiam Polybium refert, qui rempublicam Romanam suis temporibus mixtam fuisse ait. At bene notandum, Polybium non loqui de mixtura *status*, sed *administrationis*: for-

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[‡] [I do not here quote the authority of Polybius, who reckons the Roman among mixed governments, though it was at that time, if we regard, not its *acts*, but the right of action, entirely popular. For the authority of the Senate, which he refers to the Aristocratic form, and of the Consuls, whom he views as a kind of Kings, was subordinate to the people. This observation may be made on other political writers, who regard rather the external appearance and usual administration of the government, than the right of supreme power, which agrees with its institution.]

It is easy to see how much this scantiness and want of precision in our political vocabulary, must contribute to mislead the judgments of those reasoners who do not analyze very accurately the notions annexed to their words; and, at the same time, what a purchase they afford to the sophistry of such writers as are disposed, in declamations addressed to the multitude, to take an undue advantage of the ambiguities of language.

Another source of errour which goes far to invalidate the authority of various political maxims supposed to be founded on *experience*, is the infinite multiplicity of the seemingly trifling and evanescent causes connected with local manners and habits, which, in their joint result, modify, and in some cases counteract so powerfully, the effects of written laws and of established forms. Of these causes no verbal description can convey an adequate idea; nor is it always possible, even for the most attentive and sagacious observer, when the facts are before his eyes, to appreciate all their force:—So difficult is it to seize the nicer shades which distinguish the meanings of corresponding terms in different languages; and to enter, at years of maturity, into those delicate and complex associations, which, in the mind of a well-educated native, are identified with the indigenous feelings of national sympathy and taste.

Of the truth of this remark, a striking illustration presents itself in the mutual ignorance of the French and English nations (separated from each other by a very narrow channel, and, for centuries past, enjoying so many opportunities of the most familiar intercourse) with respect to the real import of the words and phrases marking the analogous gradations of rank in the two countries. The words *gentilhomme* and *gentleman* are both derived from the same etymological root; yet how imperfect a translation does the one afford of the other! and how impossible to convey by a definition all that is implied in either! Among French writers of no inconsiderable name, we meet with reasonings which plainly shew, that they considered the relative rank of the members of our two Houses of Parliament, as something similar to what is expressed in their own language by the words *noble* and *roturier*;—while others, puzzled with the inexplicable phenomena occasionally arising from the boundless field of ambition opened in this fortunate island to every species of industry and of enterprise, have been led to conclude, that birth has, among us, no other value than what it derives from the privileges secured by the constitution to our hereditary legislators. Few perhaps but the natives of Great Britain are fully aware, how very remote from the truth are both these suppositions.

I transcribe the following passage from an article in the French *Encyclopédie*, written by an author of some distinction both for talents and learning; and which, it is not impossible, may be quoted at some future period in the history of the world, as an authentic document with respect to the state of English society in the 18th century. The writer had certainly much better access to information than was enjoyed by those to whom we are indebted for our experimental knowledge of the ancient systems of policy.

« En Angleterre, la loi des successions attribue aux ainés dans les familles nobles « les biens immeubles, à l'exclusion des cadets qui n'y ont aucune part. Ces ca- « dets sans bien cherchent à reparér leurs pertes dans l'exercice du *négoce*, et « c'est pour eux un moyen presque sur de s'enrichir. Devenus riches, *ils* quittent « la profession, ou même sans la quitter, leurs enfans rentrent dans tous les droits « de la noblesse de leur famille; leurs ainés prennent le titre de *milord* si leur nais- « sance et la possession d'une terre pairie le leur permettent.—Il faut néanmoins « remarquer, que quelque fière que soit la noblesse Angloise, lorsque les nobles en- « trent en apprentissage, qui selon les réglemens doit être de sept ans entiers, ja-

ma enim reipublicae erat mere popularis, sed administratio divisa fuit inter consules, senatum, et populum."*

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* [Our author reckons even Polybius as among those who mistake in supposing that the Roman ought to be reckoned among the mixed governments. But it should be remarked, that Polybius is not here speaking of the mixture of the *form*, but of its *administration*. The form of the Republic was entirely popular, but the administration was divided among the Consuls, the Senate, and the People.]

" mais ils ne se couvrent devant leurs maîtres leur parlant et travaillant tête nue,
" quoique souvent le maitre soit roturier et de race marchande, et que les appren-
" tifs soient de la première noblesse."* Encyclop. Method. Commerce, Tom. 3.
Article *Noblesse.*

Note (AA.) page 256.

" Metaphysicae pars secunda est finalium causarum inquisitio, quam non ut
" praetermissam, sed ut male collocatam notamus. Solent enim inquiri inter
" physica, non inter metaphysica. Quanquam si ordinis hoc solum vitium es-
" set, non mihi fuerit tanti. Ordo enim ad illustrationem pertinet, neque est
" ex substantia scientiarum. At haec ordinis inversio defectum insignem pe-
" perit, et maximam philosophiae induxit calamitatem. Tractatio enim causa-
" rum finalium in physicis, inquisitionem causarum physicarum expulit et de-
" jecit, effecitque ut homines in istiusmodi speciosis et umbratilibus causis ac-
" quiescerent, nec inquisitionem causarum realium, et vere physicarum, strenue
" urgerent, ingenti scientiarum detrimento. Etenim reperio hoc factum esse
" non solum a Platone, qui in hoc littore semper anchoram figit, verum etiam
" ab Aristotele, Galeno, et aliis, qui saepissime etiam ad illa vada impingunt.
" Etenim qui causas adduxerit hujusmodi, *palpebras cum pilis pro sepi et vallo*
" *esse, ad munimentum oculorum:* aut *corium in animalibus firmitudinem esse*
" *ad propellendos calores et frigora:* Aut *ossa pro columnis et trabibus a natu-*
" *ra induci, quibus fabrica corporis innitatur:* Aut *folia arborum emitti, quo*
" *fructus minus patiantur à sole et vento:* Aut *nubes in sublimi fieri, ut ter-*
" *ram imbribus irrigent:* Aut *terram densari et solidari, ut statio et mansio sit*
" *animalium:* et alia similia: Is in metaphysicis non male ista allegarit; in
" physicis autem nequaquam. Imo, quod coepimus dicere hujusmodi sermonum
" discursus (instar remorarum, uti fingunt, navibus adhaerentium) scientiarum
" quasi velificationem et progressum retardarunt, ne cursum suum tenerent, et
" ulterius progrederentur: et jampridem effecerunt, ut physicarum causarum in-
" quisitio neglecta deficeret, ac silentio praeterlretur. Quapropter philosophia
" naturalis Democriti, et aliorum, qui Deum et mentem a fabrica rerum amo-
" verunt; et structuram universi infinitis naturae praelusionibus et tentamen-
" tis (quas uno nomine *fatum* aut *fortunam* vocabant) attribuerunt; et rerum
" particularium causas, materiae necessitati, sine intermixtione causarum fina-
" lium, assignarunt; nobis videtur, quatenus ad causas physicas, multo soli-
" dior fuisse, et altius in Naturam penetrasse, quam illa Aristotelis, et Plato-
" nis: Hanc unicam ob causam, quod illi in causis finalibus nunquam operam
" triverunt; hi autem eas perpetuo inculcarunt. Atque magis in hac parte
" accusandus Aristoteles quam Plato: quandoquidem fontem causarum finalium,
" Deum scilicet, omiserit, et naturam pro Deo substituerit, causasque ipsas
" finales, potius ut logicae amator quam theologiae, amplexus sit. Neque
" haec eo dicimus, quod causae illae finales verae non sint, et inquisitione
" admodum dignae in speculationibus metaphysicae, sed quia dum in physica-

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* [In England, the law of inheritance gives to the eldest sons of noble families the real estate, to the exclusion of the younger, who take no part. These younger sons without property seek to repair their loss by engaging in business, which is a very certain mode of growing rich. When become wealthy, they quit business, or even without quitting it their children re-enter into all the privileges belonging to the nobility of their family; their eldest sons takes the title of *milord*, if their birth and the possession of an estate attached to a peerage, permit. We must remark, nevertheless, that how proud soever are the English nobility, when the nobles enter upon an apprenticeship, which according to the laws must be for seven whole years, they never put on their hats in presence of their master, speaking to them and working bare-headed, though the master is often a plebeian and by birth a trader, and the apprentices often of the first nobility.]

“ rum causarum possessiones excurrunt, et irruunt misere eam provinciam de-
“ populantur et vastant.”* De Augm. Scient. Lib. III. Cap. 4.

Note (BB.) page 262.

Among the earliest opponents of Des Cartes' doctrine concerning *Final Cause*, was Gassendi; a circumstance which I remark with peculiar pleasure, as he has been so unjustly represented by Cudworth and others, as a partisan, not only of the physical, but of atheistical opinions of the Epicurean school. For this charge I do not see that they had the slightest pretence to urge, but that, in common with Bacon, he justly considered the physical theories of Epicurus and Democritus as more analogous to the experimental inquiries of the moderns, than the logical subtilties of Aristotle and of the schoolmen. The following passage is transcribed in Gassendi's own words, from his Objections to the Meditations of Des Cartes.

“ Quod autem à *physica consideratione rejicis usum causarum finalium*, alià
“ fortassis occasione potuisses recte facere : at de Deo cùm agitur verendum pro-
“ profectò, ne praecipuum argumentum rejicias, quo divina sapientia, providen-
“ tia, potentia, atque adeò existentia, lumine naturae stabiliri potest. Quippe
“ ut mundum universum, ut coelum et alias ejus et praecipuas partes praeteream,
“ unde nam, aut quomodo meliùs argumentare valeas, quàm ex usu partium in
“ plantis, in animalibus, in hominibus, in te ipso (aut corpore tuo) qui similitu-
“ dinem Dei geris ? Videmus profectò magnos quosque viros ex speculatione ana-
“ tomica corporis humani non assurgere modo ad Dei notitiam, sed hymnum quo-

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* [The second branch of Metaphysics is the Investigation of *Final Causes*. This I complain of, not as neglected, but as taken up in a wrong place; as being usually sought in Physics, and not in Metaphysics. Yet if the fault lay only in the order of enquiry, I should think it of less importance, for this belongs only to the illustration, and not to the substance of learning. But this inversion of order has become the occasion of great deficiency, and has done much injury to Philosophy. For the treating of Final causes in Physics, has prevented and discouraged the investigation of physical causes, and has induced men to rest contented with these specious and visionary causes, to the neglect of those which are real and physical; to the great injury of science. And I find this has been done not only by Plato, who seems to have fixed his anchor in this sandy shore, but also by Aristotle, Galen, and others who occasionally touch upon the same shallows. Some adduce causes of this kind ; *The eyelid and eyelashes serve as a fence for the protection of the eyes—The hide in animals is a defence against cold and heat—The bones are intended by nature for posts and beams to support the fabric of the body—The leaves of trees are produced that the fruit may not suffer from the sun and wind—Clouds are raised in the atmosphere that they may water the earth with showers—The earth is made firm and solid that it may be a proper abode for animals*; and the like. Now in Metaphysics these allegations are not improper, but in physics are impertinent. Nay as we have said before, they retard the course and progress of the sciences, and have already produced an indisposition to enquire into physical causes. On this account, the natural philosophy of Democritus and others, who have rejected the Deity and an intelligent mind from the universe, and attributed its formation to an infinite number of essays and trials of nature, which in one word they call *Fate* or *Chance* ; assigning the causes of individuals to the laws of matter, without intermixture of final causes; appears to me, as far as regards physical causes, to be much more solid and to have penetrated farther into nature, than that either of Plato, or Aristotle. And for this simple reason, that the former never wasted their labour upon final causes, whereas the latter do this perpetually. And in this respect Aristotle is even more blameable than Plato; since, neglecting God, the source of Final causes, he substituted Nature instead of God, and sought them rather as a lover of Logic than of Theology. We do not say this because these final causes are not the true ones, and highly worthy of enquiry in metaphysical speculations, but because when they make incursions and inroads into physics, they miserably lay waste and depopulate that branch of philosophy.]

" que ipsi canere, quòd omnes partes ita conformaverit, collocaveritque ad usus, " ut sit omnino propter solertiam atque providentiam incomparabilem commendan- " dus."* Objectiones Quintae in Meditationem IV. *De Vero et Falso.*

I do not know if it has been hitherto remarked, that Gassendi is one of the first modern writers, by whom the following maxim, so often repeated by later physiologists, was distinctly stated ; " *Licet ex conformatione partium corporis humani,* " *conjecturas desumere ad functiones mere naturales.*"† It was from a precipitate application of this maxim that he was led to conclude, that man was originally destined to feed on vegetables alone ; a proposition which gave occasion to several memoirs by Dr. Wallis and Dr. Tyson, in the Philosophical Transactions of the Royal Society of London.

Note (CC.) page 271.

The theories of Hume, of Paley, and of Godwin, how differently soever they may have figured in the imaginations of their authors, are all equally liable to the fundamental objections stated in the text. The same objections are applicable to the generous and captivating, but not always unexceptionable morality inculcated in the writings of Dr. Hutcheson.—The system, indeed, of this last philosopher may be justly regarded as the parent stock on which the speculations of the others have been successively grafted.

Mr. Hume entered on his Inquiries concerning Morals, at a period when Dr. Hutcheson's literary name was unrivalled in Scotland. The abstract principles on which his doctrines are founded, differ widely from those of his predecessor, and are unfolded with far greater ingenuity, precision, and elegance. In various instances, however, he treads very closely in Dr. Hutcheson's footsteps ; and, in the final result of his reasonings, he coincides with him exactly. According to both writers, a regard to general expediency affords the only universal canon for the regulation of our conduct.

It is a curious circumstance in the History of Ethics, that the same practical rule of life, to which Dr. Hutcheson was so naturally and directly led by his cardinal virtue of disinterested benevolence, has been inferred by Dr. Paley from a theory which resolves moral obligation entirely into prudential calculations of individual advantage.—For the very circuitous, and (in my opinion) very illogical argument, whereby he has attempted to connect his conclusion with his premises, I must refer to his work.‡

The *political justice* of Mr. Godwin is but a new name for the principle of general expediency or utility. " The term *justice* (he observes) may be assumed as a " general appellation for all moral duty.—That this appellation (he continues) is

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* [In rejecting while you treat of physics, the use of Final causes, you might in a different part of the subject have done so with propriety ; but in treating of God, there is reason to fear that you may weaken the principal argument, by which, according to the light of nature, we establish his wisdom, his providence, his power, and therefore his existence. For to say nothing of the world, of the heavens, and of other parts of the universal frame, from what or in what manner can you reason more forcibly, than from the use of the parts in plants, in animals, in men, in your own body, who are made after the likeness of God? We find, indeed, that the greatest men have risen from anatomical speculations upon the human body, not only to the acknowledgment of God, but even to sing hymns of praise to him, as worthy of all admiration, in having formed so wonderfully the several parts, and adapted them to their proper uses.]

† [From the conformation of the parts of the human body, we may form conjectures, not unphilosophically, as to the functions which are merely natural.]

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‡ Principles of Moral and Political Philosophy, Book ii. Chap. 1, 2, 3, 4, 5, 6. The theory of Dr. Paley has been very ably examined by Mr. Gisborne, in a treatise entitled, The Principles of Moral Philosophy investigated, and briefly applied to the Constitution of Civil Society. (London, 1790.) The objections to it there stated appear to me quite unanswerable; and they possess the additional merit of being urged with all the deference so justly due to Dr. Paley's character and talents.

" sufficiently expressive of the subject, will appear, if we consider for a moment, " mercy, gratitude, temperance, or any of those duties which, in looser speaking, " are contradistinguished from justice. Why should I pardon this criminal, remu- " nerate this favour, abstain from this indulgence? If it partake of the nature of " morality, it must be either right or wrong, just or unjust. It must tend to the be- " nefit of the individual, either without entrenching upon, or with actual advan- " tage to the mass of individuals. Either way, it benefits the whole, because in- " dividuals are parts of the whole. Therefore, to do it, is just, and to forbear it is " unjust. If justice have any meaning, it is just that I should contribute every " thing in my power to the benefit of the whole." (Polit. Justice, Vol. I. pp. 80, 81.)

It is manifest, that, in the foregoing extract, the duty of *justice* is supposed to coincide exactly as a rule of conduct with the affection of *benevolence;* whereas, according to the common use of words, justice means that particular branch of virtue which leads us to respect the *rights* of others; a branch of virtue remarkably distinguished from all others by this, that the observance of it may be extorted by force; the violation of it exposing the offender to resentment, to indignation, and to punishment. In Mr. Godwin's language, the word *justice* must either be understood to be synonymous with general *benevolence*, or—assuming the existence of such an affection—to express the *moral fitness* of yielding, upon all occasions, to its suggestions. "It is *just* (says Mr. Godwin) that I should contribute every " thing in my power to the benefit of the whole.—My benefactor ought to be es- " teemed, not because he bestowed a benefit upon me, but because he bestowed " it upon a human being. His desert will be in exact proportion to the degree in " which the human being was worthy of the distinction conferred. Thus, every " view of the subject brings us back to the consideration of my neighbour's moral " worth, and his importance to the general weal, as the only standard to determine " the treatment to which he is entitled. Gratitude, therefore, a principle which " has so often been the theme of the moralist and the poet, is no part either of "*justice* or virtue." (Ibid. p. 84.) The words *just* and *justice* can, in these sentences, mean nothing distinct from morally *fit* or *reasonable;* so that the import of the doctrine amounts merely to the following proposition. That it is reasonable or right, that the private benevolent affections should, upon all occasions, yield to the more comprehensive;—which is precisely the system of Hutcheson disguised under a different and much more exceptionable phraseology.

This abuse of words is not without its effect in concealing from careless readers the fallaciousness of some of the author's subsequent arguments; for although the idea he professes to convey by the term *justice*, be essentially different from that commonly annexed to it, yet he scruples not to avail himself, for his own purpose, of the received maxims which apply to it in its ordinary acceptation. In discussing, for example, the validity of promises, he reasons thus. "I have promised to " do something just and right.—This certainly I ought to perform. Why? Not " because I promised it, but because *justice* prescribes it. I have promised to be- " stow a sum of money upon some good and respectable purpose. In the interval " between the promise and my fulfilling it, a greater and nobler purpose offers *itself*, " which calls with an imperious voice for my co-operation. Which ought I to pre- " fer? That which best deserves my preference. A promise can make no altera- " tion in the case. I ought to be guided by the intrinsic merit of the objects, and " not by any external and foreign consideration. No engagements of mine can " change their intrinsic claims.—If every shilling of our property, every hour of " our time, and every faculty of our mind, have already received their destination " from the principles of *immutable justice*, promises have no department left upon " which for them to decide. *Justice*, it appears therefore, ought to be done, wheth- " er we have promised it or not." (Ibid. p. 151.)

It is quite evident, that, in this passage, the paramount supremacy indisputably belonging to *justice* in its usual and legitimate sense, is ascribed to it when employed as synonymous with *benevolence;* and of consequence, that the tendency of the new system, instead of extending the province of *justice*, properly so called, is to set its authority entirely aside, wherever it interferes with views of utility. In this respect, it exhibits a complete contrast to all the maxims hitherto recognized among moralists. The rules of justice are happily compared by Mr. Smith, to the strict and indispensable rules of grammar; those of benevolence to the more loose and general descriptions of what constitutes the sublime and beautiful in writing that we meet with in the works of critics. According to Mr. Godwin, the reverse of this comparison is agreeable to truth; while, at the same time, by a dexterous change in the meaning of terms, he assumes the appearance of combating for the very cause which he labours to betray.

Of the latitude with which the word *justice* had been previously used by many ethical writers, a copious and choice collection of instances may be found in the learned and philosophical notes subjoined by Dr. Parr to his Spital Sermon. (London, 1801.) "By none of the ancient philosophers, however, (as he has well observed,) is justice set in *opposition* to any other social duty; nor did they employ the colossal weight of the *term* in crushing the other moral excellencies, which were equally considered as pillars in the temple of virtue." pp. 28, 29, 30, 31.[*]

Note (DD.) page 271.

As the main purpose of this section is to combat the logical doctrine which would exclude the investigation of Final Causes from natural philosophy, I have not thought it necessary to take notice of the sceptical objections to the theological inferences commonly deduced from it. The consideration of these properly belongs to some inquiries which I destine for the subject of a separate Essay. On *one* of them alone I shall offer at present a few brief remarks, on account of the peculiar stress laid upon it in Mr. Hume's Posthumous Dialogues.

"When two *species* of objects (says Philo) have always been observed to be conjoined together, I can *infer*, by custom, the existence of one wherever I *see* the existence of the other: and this I call an argument from experience. But how this argument can have place, where the objects, as in the present case, are single, individual, without parallel, or specific resemblance, may be difficult to explain. And will any man tell me, with a serious countenance, that an orderly universe must arise from some thought and art, like the human, because we have experience of it? To ascertain this reasoning, it were requisite that we had experience of the origin of worlds; and it is not sufficient surely, that we have seen ships and cities arise from human art and contrivance.—Can you pretend to shew any similarity between the fabric of a house, and the generation of the universe? Have you ever seen Nature in any such situation as resembles the first arrangement of the elements? Have worlds ever been formed under your eye; and have you had leisure to observe the whole progress of the phenomenon, from the first appearance of order to its final consummation? If you have, then cite your experience, and deliver your theory."

This celebrated argument appears to me to be little more than an amplification of that which Xenophon puts into the mouth of Aristodemus, in his conversation with Socrates, concerning the existence of the Deity. "I behold (says he) none of those governours of the world, whom you speak of; whereas here, I see artists actually employed in the execution of their respective works."—The reply of Socrates, too, is in substance the same with what has been since retorted on Philo by some of Mr. Hume's opponents. "Neither, yet, Aristodemus, seest thou thy soul, which, however, most assuredly governs thy body:—Although it may well seem, by thy manner of talking, that it is *chance* and not *reason* which governs thee."

Whatever additional plausibility Philo may have lent to the argument of Aristodemus, is derived from the authority of that much abused maxim of the inductive logic, that "all our knowledge is entirely derived from experience." It is curious, that Socrates should have touched with precision on one of the most important exceptions with which this maxim must be received. Our knowledge of our own existence as sentient and intelligent beings, is (as I formerly endeavoured to shew) not an inference from experience, but a fundamental law of human belief. All that experience can teach me of my internal frame, amounts to a knowledge of the various mental operations whereof I am conscious; but what light does experience throw on the origin of my notions of personality and identity? Is it from having observed a constant conjunction between sensations and sentient beings; thoughts and thinking beings; volitions and active beings; that I infer the existence of *that* individual and permanent *mind*, to which all the phenomena of my consciousness belong? Our conviction that *other men* are, like ourselves, possessed of thought and reason; together with all the judgments we pronounce on their intellectual and moral characters, cannot (as is still more evident) be resolved into an experimental perception of the conjunction of different objects or events. They are inferences of design from its sensible effects, exactly analogous to those which, in the instance of the universe, Philo would reject as illusions of the fancy.[*]

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[*] Having mentioned the name of this eminent person, I eagerly embrace the opportunity of acknowledging the instruction I have received, not only from his various publications, but from the private literary communications with which he has repeatedly favoured me From one of these (containing animadversions on some passages in my Essay on the Sublime,) I entertain hopes of being permitted to make a few extracts in a future edition of that performance. By his candid and liberal strictures, I have felt myself highly honoured; and should be proud to record, in his own words, the corrections he has suggested of certain critical and philological judgments, which, it is highly probable, I may have too lightly hazarded.

But leaving for future consideration these abstract topics, let us, for a moment, attend to the scope and amount of Philo's reasoning.—To those who examine it with attention it must appear obvious, that, if it proves any thing, it leads to this general conclusion, That it would be perfectly impossible for the Deity, if he *did* exist, to exhibit to Man any satisfactory evidence of *design* by the order and perfection of his works. That every thing we see *is consistent* with the supposition of its being produced by an intelligent author, Philo himself has explicitly acknowledged in these remarkable words: "Supposing there were a God, who did not discover "himself immediately to our senses; would it be possible for him to give stronger "proofs of his existence, than what appear on the whole face of nature? What, in- "deed, could such a Divine Being do, but copy the present economy of things;— "render many of his artifices so plain, that no stupidity could mistake them;— "afford glimpses of still greater artifices, which demonstrate his prodigious supe- "riority above our narrow apprehensions;—and conceal altogether a great many "from such imperfect creatures?"—The sceptical reasonings of Philo, therefore, do not, like those of the ancient Epicureans, hinge, in the least, on alleged disorders and imperfections in the universe, but entirely on the impossibility, in a case to which experience furnishes nothing parallel or analogous, of rendering intelligence and design manifest to our faculties by their sensible effects.—In thus shifting his ground from that occupied by his predecessors, Philo seems to me to have abandoned the only post from which it was of much importance for his adversaries to dislodge him. The logical subtilties, formerly quoted, about experience and belief, (even supposing them to remain unanswered,) are but little calculated to shake the authority of principles, on which we are every moment forced to judge and to act by the exigencies of life. For this change in the tactics of modern sceptics, we are evidently, in a great measure, if not wholly, indebted to the lustre thrown on the order of nature, by the physical researches of the two last centuries.

Another concession extorted from Philo by the discoveries of modern science is still more important. I need not point out its coincidence with some remarks in the first part of this section, on the unconscious deference often paid to final causes by those inquirers who reject them in theory;—a coincidence which had totally escaped my recollection when these remarks were written. I quote it here, chiefly as a pleasing and encouraging confirmation of the memorable prediction with which Newton concludes his Optical Queries; that "if *Natural Philosophy*, in all "its parts, by pursuing the inductive method, shall at length be perfected, the "bounds of *Moral Philosophy* will be enlarged also."

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[*] This last consideration is ably stated by Dr. Reid. (See Essays on the Intellectual Powers, pp. 631, 632. 4to ed.) The result of his argument is, that "according to Philo's reasoning, we can have no evidence of mind or design in any of our fellow-men."—At a considerably earlier period, Buffier had fallen into the same train of thinking. Among the judgments which he refers to *common sense*, he assigns the first place to the following. "1. *Il y a d'autres êtres, et d'autres hommes que moi au monde.* 2. *Il y a dans eux quelque chose qui s'appelle vérité, sagesse, prudence,*" &c. &c. (Cours de Sciences, p. 566. Paris 1732.) I have already objected to the application of the phrase *common sense* to such judgments as these; but this defect in point of expression does not detract from the sagacity of the author in perceiving, that in the conclusions we form concerning the minds and characters of our fellow creatures, (as well as in the inferences drawn *concerning the invisible things of God from the things which are made,*) there is a perception of the understanding implied, for which neither reasoning nor experience is sufficient to account.

"A purpose, an intention, a design, (says Philo) strikes every where the most "careless, the most stupid thinker; and no man can be so hardened in absurd "systems, as at all times to reject it. *That Nature does nothing in vain*, is a "maxim established in all the schools, merely from the contemplation of the "works of Nature, without any religious purpose; and from a firm conviction "of its truth, an anatomist, who had observed a new organ or canal, would "never be satisfied till he had also discovered its use and intention. One "great foundation of the COPERNICAN system is the maxim, *That Nature acts "by the simplest methods, and chooses the most proper means to any end*; and "astronomers often, without thinking of it, lay this strong foundation of piety "and religion. The same thing is observable in other parts of philosophy: "And thus all the sciences lead us almost insensibly to acknowledge a first in-"telligent author; and their authority is often so much the greater, as they "do not directly profess that intention."

* Page 62.

Since this sheet was cast off, I have been informed, from the best authority, that the conversation here alluded to, which I had understood to have taken place between Lord Chief Justice Mansfield and the late Sir Basil Keith, really passed between his Lordship and another very distinguished officer, the late gallant and accomplished Sir Archibald Campbell. I have not, however, thought it worth while, in consequence of a mistake which does not affect the substance of the anecdote, to cancel the leaf; more especially, as there is at least a possibility, that the same advice may have been given on more than one occasion.

APPENDIX.

ARTICLE I. (See page 94

THE following article relates entirely to the question,—"How far it is true, that "all mathematical evidence is resolvable into identical propositions?" The discussion may, in one point of view, be regarded as chiefly verbal; but that it is not, on that account, of so trifling importance, as might at first be imagined, appears from the humiliating inference to which it has been supposed to lead concerning the narrow limits of human knowledge. "Put the question," says Diderot, "to any candid mathematician, and he will acknowledge, that all mathematical "propositions are merely identical; and that the numberless volumes written (for "example) on the circle, only repeat over in a hundred thousand forms, that it is "a figure in which all the straight lines drawn from the centre to the circumference "are equal. *The whole amount of our knowledge, therefore, is next to nothing*."—That Diderot has, in this very paradoxical conclusion, stated his own real opinion, will not be easily believed by those who reflect on his extensive acquaintance with mathematical and physical science; but I have little doubt, that he has expressed the amount of the doctrine in question, agreeably to the interpretation put on it, by the great majority of readers.

As the view of this subject which I have taken in the text, has not been thought satisfactory by my friend M. Prevost, I have thought it a duty, both to him and to myself, to annex to the foregoing pages, in his own words, the remarks subjoined to the excellent and faithful translation with which he has honoured this part of my work, in the *Bibliothèque Britannique*. Among these remarks, there is scarcely a proposition to which I do not give my complete assent. The only difference between us turns on the propriety of the language in which some of them are expressed; and on this point it is not surprising, if our judgments should be somewhat biassed by the phraseology to which we have been accustomed in our earlier years. The few sentences to which I am inclined to object, I have distinguished from the rest, by printing them in small capitals.—Such explanations of my own argument as appear to be necessary, I have thrown into the form of notes, at the foot of the page.

In the course of M. Prevost's observations on the point in question, he has introduced various original and happy illustrations of the important distinction between *conditional* and *absolute* truths;—a subject on which I have the pleasure to find, that all our views coincide exactly.

(1) "A la fin de l'article que l'on vient de lire, * l'ingénieux auteur renvoie à ce qu'il a dit au commencement. Il pense y avoir suffisamment prouvé que l'évidence

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(1) At the conclusion of the article which we have just read,* the ingenious author refers to what he had said at the commencement. He thinks he has there sufficient-

* Chap. II. Sect. 3. Art. II. of this Volume.

particulière qui accompagne le raisonnement mathématique ne peut pas se résoudre dans la perception de l'identité. Recourons donc à cette preuve. Elle se trouve consister toute entière en réfutation.

" I. L'auteur commence par remarquer, que quelques personnes fondent l'opinion qu'il rejette sur celle qui prend les axiomes pour premiers principes. Et comme il a combattu celle-ci, il en conclut que sa conséquence doit être fausse. Un tel argument a en effet beaucoup de force pour ceux qui sont partis d'une certaine theorie sur les axiomes pour en conclure l'assertion contestée ; mais il n'en a point pour les autres. Le rédacteur de cet article se range parmi ces derniers. Il a dit et il pense encore, que le mathématicien avance de supposition en supposition ; que c'est en retournant sa pensée sous diverses formes, qu'il arrive à d'utiles résultats ; QUE C'EST LA RECONNOISSANCE DE QUELQUE IDENTITE QUI AUTORISE CHACUNE DE SES CONCLUSIONS ; et toutefois il a dit et il persiste à croire, que les axiomes mathématiques ne font que tenir la place ou de définitions ou de théorêmes, ; et que les définitions sont les seuls principes des sciences de la nature de la géométrie. Voici ses propres expressions.* " J'observe " que de bonnes définitions initiales sont les seuls principes rigoureusement suffisans " dans les sciences de raisonnement pur....... C'est dans les définitions que sont vé" ritablement contenues les hypothèses dont ces sciences partent......... On pourroit " concevoir [toujours dans ces mêmes sciences], que les principes fussent si nette" ment posés, que l'on n'y trouvât autre chose que de bonnes définitions. De ces " definitions retournées, résulteroient toutes les propositions subséquentes. LES " DIVÈRSES PROPRIETES DU CERCLE QUE SONT-ELLES AUTRE CHOSE, QUE " DIVÈRSES FACES DE LA PROPOSITION QUI DEFINET CETTE COURBE ?— " C'est donc l'imperfection (peutêtre inévitable) de nos conceptions, qui a " engagé à faire entrer les axiomes pour quelque chose dans les principes des sci" ences de raisonnement pur. Et ils y font un double office. Les uns remplacent " des définitions. Les autres remplacent des propositions susceptibles d'être " démontrées."

" Il est manifeste que celui qui a tenu de tout temps ce langage n'a pas fondé son opinion, vraie ou fausse, relativement à l'evidence mathématique, sur une opinion

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ly proved, that the particular evidence which accompanies mathematical reasoning cannot be resolved into the perception of identity. Let us recur to this proof. It will be found to consist wholly in refutation.

I. The author commences by remarking, that some persons lay the foundation of the opinion which he opposes, upon the principle which considers axioms as first principles ; and as he has denied this, he concludes that its consequence is false. This argument may be a good one against those who deduce the opinion which he combats, from a certain theory of axioms, but is of no force whatever against others. The Reviewer of this article ranks himself amongst these last. He has said and he still thinks, that a mathematician advances from one supposition to another; that it is by exhibiting his position in different forms that he is enabled to arrive at useful results ; *that it is the recognition of some Identity which authorises each of his conclusions ;* and he has always said, and continues to believe, that mathematical axioms serve no other purpose, but to supply the place either of definitions or of theorems. These are his words.* " I observe, that good elementary definitions " are, strictly speaking, the only solid principles in the sciences of pure reasoning. " . . . . . It is in definitions that are really contained the hypotheses whence " these sciences spring. It is possible to conceive, (always speaking of the same " sciences,) that their principles have been laid down so distinctly, that we find in " them only good definitions. From these definitions frequently examined, result " all the subsequent propositions. *The different properties of the circle, what are " they, but different phases of the proposition which defines this curve?* It is then " the imperfection, perhaps inevitable, of our conceptions which has occasioned the " use of axioms for certain purposes in the principles of the sciences of pure reason" ing. They there perform a double office. Some supply the place of definitions, " Others of proportions susceptible of demonstration."

It is clear that the present Reviewer, who has at all times held this language, has not founded his opinion, whether true or false, relative to mathematical evidence,

* Essais de Philos. Tom. II. p. 29, à Genève chez Paschoud, 1804.

fausse relativement aux axiomes; ou du moins, qu'étant si parfaitement d'accord avec Mr Dugald Stewart en ce qui concerne les premiers principes des mathématiques, ce n'est point de la que dérive l'apparente discordance de ses expressions et de celles de son ami, sur ce qui concerne le principe de l'évidence mathématique dans la déduction démonstrative. Dès lors il est évident que ce premier argument de l'auteur reste pour lui comme nul.

"II. Passons au second. Celui-ci est encore purement négatif et personnel. Il s'adresse à ceux qui derivent, d'un principe propre à la géométrie, l'*assertion* que l'auteur combat. De ce que l'égalité en géométrie se démontre par la congruence, ces philosophes se pressént de conclure, que, dans toutes les mathématiques, les vérités reposent sur l'identité. Ceux donc qui n'ont jamais songé à donner un tel appui à l'assertion contestée ne peuvent absolument pas se rendre à l'attaque dirigée contre cet appui. Il est probable qu'un très-grand nombre de partisans du principe de l'identité, considéré comme base de la démonstration, se trouvent (comme le rédacteur peut ici le dire de lui-même) tout à fait étrangers à la manière de raisonner que l'auteur réfute; et n'ont point formé leur opinion relativement à l'évidence mathématique d'après la congruence (*réelle* ou *potentielle*) de deux espaces. C'est ce que le rédacteur affirme ici, quant à lui, de la manière la plus positive; et de là résulte que l'argument personnel,[*] dirigé contre ceux qui ont été menés d'une de ces opinions à l'autre, ne l'atteint point.

"Il est un peu plus difficile de prouver cette affirmation, que quand il étoit question des axiomes, parce que ceux-ci ne peuvent pas manquer de s'offrir aux recherches du logicien, au lieu qu'il n'est pas appelé à prévoir l'application inconsidérée du principe de superposition à toute espèce de démonstration. Si cependant il fait voir que son opinion sur la démonstration dérive de principes universels et tout différens de celui qu'on a en vue, il aura fait, je pense, tout ce qu'il est possible d'attendre de lui.

"Qu'il soit maintenant permis au rédacteur de quitter la tierce personne, et pour éviter quelques longueurs et quelques expressions indirectes, d'établir nettement son opinion et la marche qu'il a tenue en l'exposant.

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upon a false opinion relative to axioms. Or at least, being so perfectly in agreement with Mr. Dugald Stewart, as to what concerns the first principles of mathematics, it is not from this is derived the apparent disagreement of his expressions with those of his friend, as to what concerns the principle of mathematical evidence in demonstrative induction. Hence it is evident, that this first argument of the author remains, as respects the present writer, of no force whatever.

II. Let us pass to the second. This is still purely negative and personal. It is addressed to those who derive from a principle confined to geometry, the assertion which the author combats. From the circumstance, that equality in geometry is demonstrated by coincidence, these philosophers hasten to conclude, that in all the branches of Mathematics, truth depends upon identity. Those, then, who have never dreamed of calling in such a proof of the contested point, are not absolutely obliged to expose themselves to the attack which is directed against this proof. It is probable, that a very large number of the partisans of the principle of identity, considered as the basis of demonstration, are, as the Reviewer confesses *himself* to be, altogether strangers to the manner of reasoning which the author refutes, and have not formed their opinion relative to mathematical evidence, by the coincidence, (real or potential,) of two spaces. This the Reviewer affirms as respects himself, in the most positive manner, and does not feel the force of the argumentum ad hominem, directed against those who are led by one of those opinions to the other.

It is rather more difficult to prove this affirmation, than when it was a question of Axioms, because these last do not fail to offer themselves to the researches of the logician, whereas he is not expected to foresee the inconsiderate application of the principle of superposition to every species of demonstration. If, nevertheless, he makes it appear, that his opinion upon demonstration is drawn from principles which are universal, and altogether different from those in view, he will have done, I think, all that can be expected from him.

May it now be permitted the Reviewer to drop the third person, and in order to avoid some prolixity and indirect modes of expression, to state plainly his opinion, and the course he has taken in supporting it.

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[*] Ad hominem.

“Dès les premières pages de ma logique, je pars de la distinction à faire entre les deux genres de vérité ; la *conditionnelle* et *l'absolue*. Puis j'ajoute :

“LE MOYEN UNIQUE, PAR LEQUEL NOUS CONNOISSONS SI UNE PROPOSITION CONDITIONNELLE EST VRAIE, OU LE CARACTERE D'UNE TELLE VERITE, EST L'IDENTITE BIEN ETABLIE ENTRE LE PRINCIPE ET LA CONSEQUENCE. CETTE IDENTITE N'EST PAS COMPLETE SANS DOUTE ; MAIS ELLE EST TELLE A QUELQUE EGARD, QUE LA CONSEQUENCE DOIT ETRE TOUTE ENTIERE COMPRISE DANS LE PRINCIPE.”*

“Traitant ensuite des sciences selon leur genre, j'appelle sciences *de raisonnement pur* celles qui ne s'occupent que de la vérité conditionnelle. Je cherche, d'une manière générale et abstraite, les caractères de ces sciences. J'en fais ensuite l'application aux mathématiques dans les deux branches qu'elles comprennent ; et c'est par cette voie, que je me trouve avoir déterminé la nature de la démonstration. J'ai soin du reste de faire remarquer que la nature du raisonnement pur, ou proprement dit, ne dépend nullement du sujet, et qu'il n'est propre aux mathématiques qu'en ce sens que ces dernières s'ocuppent de raisonnement d'une manière exclusive et n'y mêlent point des propositions de vérité absolue, comme font les sciences de *fait et d'expérience*. En voilà assez, je crois, pour faire voir que ce n'est pas témérairement que j'affirme n'avoir en aucune façon conçu la nature de la démonstration d'après le point de vue borné de la superposition. Je ne puis donc,

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In the first pages of my Logic, I speak of the distinction between the two kinds of Truth ; *conditional* and *absolute ;* afterwards I add :

*The only means by which we know if a conditional proposition is true, or the character of such a certain truth, is the well established Identity between the principle and the consequenee. This Identity, doubtless, is not complete, but it is, nevertheless, so far complete, that the consequence must always be entirely comprised in the principle.**

In afterwards treating of the sciences according to their kinds, I call those, *sciences of pure reasoning*, which are occupied with conditional truth. I seek, in a general and abstract manner, the characters of these sciences. I afterwards make the application to mathematics in the two branches which they comprise ; and by this method, I find I have determined the nature of demonstration. I have been careful to remark, that the nature of pure reasoning, properly so called, does not depend upon the subject, and that it is not peculiar to mathematics, except in the sense that these are taken up exclusively with reasoning, and are not mingled with propositions of absolute truth, as are the sciences which relate to *fact and experience*. I have said enough, I think, to make it clear that I do not speak rashly, when I affirm, that I have never in any way considered the nature of demonstration in the point of view bounded by superposition. I cannot, then, as respects myself, give

* Essais de Phil. Tom. II. p. 2. “Le lecteur équitable voudra bien se rappeler que l'ouvrage, dont ce passage est tiré, n'est que l'esquisse d'un cours fort étendu, dans lequel se trouvent développés, par des exemples et de toute manière, les simples énoncés du texte. A peine est-il nécessaire de dire ici en explication ce que j'entends par l'identité complète ou non complète entre le principe et sa conséquence. Si je conclus, par exemple, du genre à l'espèce, il y a identité incomplète ; comme lorsqu'ayant prouvé une vérité de tout polygone, je l'affirme du triangle en particulier. Il y a identité complète dans une équation. Et on entend bien que l'identité dont il s'agit est celle de la quantité (du nombre des unités), et non de toute autre. Ces deux exemples me semblent suffire pour prévenir toute équivoque.”†

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† [The candid reader will recollect that the work from which this passage is taken, is only a sketch of a very extended course, in which are developed by examples and in every way, the simple propositions enunciated in the text. It is hardly necessary to speak here in explanation of what I mean by Identity, complete and incomplete, between the premises and the consequence. If I reason, for instance, from the genus to the species, it is an incomplete identity ; as when having proved a truth of every polygon. I affirm it of a triangle in particular. In an equation the identity is complete ; and we well understand, that the identity of which we treat is that of quantity, (of a number of units,) and not of every other. These two examples appear to me sufficient to prevent all mistake.]

quant à moi, donner mon assentiment à un argument qui n'attaque que ceux dont l'opinion a cette base.

"III. On est toujours long quand on réfute une réfutation. J'aurois donc tort de m'étendre au-delà de ce qui est strictement nécessaire pour établir nettement l'état de la question. Je ne discuterai pas des opinions qui me sont étrangères, telles que celles de Leibnitz, de l'auteur d'une Dissertation latine imprimée à Berlin en 1764, de Barrow, Condillac, Destutt-Tracy. Il me suffit d'avoir répondu, pour moi et pour ceux qui pensent comme moi, aux deux seuls argumens de l'auteur, contre l'opinion que j'ai dès long-temps adoptée.

"J'ajouterai cependant un mot au sujet d'une remarque, que l'auteur introduit en disant, qu'elle est *applicable à toutes les tentatives que l'on a faites pour établir l'opinion dont il s'agit.* "Accordant, dit-il, que toutes les propositions mathématiques puissent être représentées par la formule $a = a$, il ne s'ensuivroit nullement "que chaque pas du raisonnement, qui conduit à ces conclusions, soit une proposition de même nature." Je prie l'auteur de cette objection de vouloir bien réfléchir un instant sur le sens du mot *pas* ramené à son expression propre et non figurée. Certainement un *pas du raisonnement* n'est autre chose qu'une proposition. Si donc on accorde que toute proposition est représentée par $a = a$, il faudra bien que tout *pas* soit de même nature.*

"Quant à la lettre chiffrée, certainement elle diffère de la non-chiffrée quant aux signes écrits ; comme aussi les plus exagérés partisans du principe de l'identité ne nieront pas que l'expression *deux plus deux* ne soit différénte de l'expression *quatre.* Dans l'un et l'autre cas le signe diffère, le sens que l'on a en vue est le même.

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my assent to an argument which bears upon those only whose opinion rests upon this foundation.

III. In refuting a refutation we are necessarily prolix. I should then be wrong to go farther than is strictly necessary to establish clearly the state of the question. I will not discuss opinions which are foreign to me; such as those of Leibnitz, of the author of the latin Dissertation printed at Berlin in 1764, of Barrow, Condillac, Destutt-Tracy. It is sufficient that I answer, for myself and for those who think with me, the only two arguments of the author against the opinion which I have for a long time adopted.

I shall add, nevertheless, one word on the subject of a remark, which the author introduces by saying, that it is applicable to all the attempts which have been made to establish the opinion of which he treats. "Granting," says he, "for "the sake of argument, that all mathematical propositions may be represented by "the formula $a = a$, it would not therefore follow, that every step of the reasoning leading to these conclusions, is a proposition of the same nature." I beg the author of this objection, for a moment to reflect upon the meaning of the word *step*, when recalled to its literal expression. Certainly, a *step of reasoning* differs in no respect from a proposition. If then we grant that every proposition is represented by $a = a$, it will follow, that every *step* is of the same nature.*

As to the letter in cyphers, certainly it differs from one not in cyphers as respects written signs; as also the most zealous partizans of identity will not deny that the expression, *two* plus *two*, is different from the expression *four.* In both cases the sign is different, the sense which we see it in, is the same.

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* That the word *pass* or *step* is a figurative expression, when applied to a process of reasoning, cannot be disputed ; and the same remark may be extended to the word *proposition*, and to almost every other term employed in discussions connected with the Human Mind. It may be doubted, however, whether it can be correctly asserted, that *a step of reasoning* differs in no respect from a *proposition.* In *our* language, at least, the word *step* properly denotes, not a proposition, but the *transition* to a new proposition from others already known. Thus, when I say, "the area of a triangle, having the circumference of a circle for its base, and the radius for its altitude, is *greater* than the area of "any polygon inscribed in the circle," I enunciate a *proposition.* When I say that "the area of the same triangle is *less* than that of any circumscribed polygon," I enunciate another *proposition.* But when I *infer* from these two propositions, that the areas of the triangle and circle are *equal*, I obtain possession of a new truth distinct from either; nor is it easy to imagine a more significant metaphor for expressing this acquisition, than to say, that I have advanced or gained *a step* in the study of geometry.

“ IV. Les observations précédentes ont pour but de prouver que, dans les procédés de raisonnement (procédés que les mathématiques offrent dégagés de tout mélange,) on déduit les conséquences en s'appuyant constamment sur LE PRINCIPE D'IDENTITE. Je dois dire un mot maintenant de la raison pour laquelle je crois nécessaire d'établir solidement ce principe et de la mettre au-dessus de tout attaque. Cette raison est, qu'à l'instant où on le perd de vue; on court risque de confondre deux genres de vérités, que nous savons tous qu'il faut distinguer. Ce qu'il importe de prévenir, c'est le passage inaperçu du relatif à l'absolu ; c'est une conclusion vicieuse, déduite régulièrement d'une hypothèse, et témérairement appliquée à ce qui est indépendant de cette hypothèse. Ce sophisme, qui paroît grossier, a néanmoins été commis plus d'une fois et le sera, dans quelques occasions déceptrices, par ceux qui n'auront pas pleinement analysé le travail du raisonnement.

“ Tout se réduit, sans doute, en fait de raisonnement, à reconnoître que la conséquence est bien déduite du principe. Mais quel est le caractère auquel on reconnoîtra que cette déduction a été bien faite ? C'est ce que ne disent pas ceux qui rejettent le caractère de l'identité. Et j'avoue que je ne conçois pas quel autre on pourroit tenter d'y substituer. CELUI-LA EST SIMPLE ET CLAIR.* On peut, à chaque proposition, s'arrêter pour voir si elle n'est que le développement d'une précédente ; et si, par inadvertance on sort du genre, en mêlant des faits aux hypothèses, on est ramené forcément à celles-ci.

“ Si Jean Bernouilli et Leibnitz avoient reconnu leurs hypothèses aussi nettement qu'Euler les reconnut plus tard, ils n'auroient pas été divisés d'opinion sur la nature des logarithmes des nombres négatifs et imaginaires. Si Huyghens n'avoit vu, dans le travail du mathématicien, que le retournement de ses propres hypothèses, il ne se seroit pas servi peut-être l'expression que rapporte Leibnitz. Ce dernier lui ayant montré, qu'une quantité mêlée d'imaginaires pouvoit être convertie en quantité réelle, “ Huyghens, dit Leibnitz, trouva cela si admirable, qu'il me répondit qu'il y a là-dedans quelque chose qui nous est incompréhensible.”†

IV. The preceding observations have for their object, to prove, that in processes of reasoning, processes which the mathematics offer free of every mixture, we deduce consequences by resting constantly upon the *principle of identity*. I ought now, to say a word upon the reason for which I think it necessary to establish solidly this principle, and to put it beyond all controversy. This reason is, that the instant we lose sight of it, we run the risk of confounding two kinds of truth, which we all know ought to be distinguished. What it is necessary to prevent, is the unperceived passage of the conditional to the absolute. It is a vicious conclusion deduced regularly from an hypothesis, and rashly applied to what is independent of this hypothesis. This sophism, which appears gross, has nevertheless often been fallen into, and will be so on some deceptive occasions, by those who shall not have fully analyzed the labour of reasoning. Every thing is reduced, without doubt, in the process of reasoning, to the certainty that the consequence is fairly deduced from the premises. But what is the character by which we shall be able to know that this deduction has been truly made? This is what they do not tell us, who reject the character of identity. And I confess, I cannot conceive what other they can attempt to substitute. *This is simple and clear.** We are able at each proposition, to stop, and consider whether it be any thing more than a developement of the former, and if, by inadvertence we go out of the genus, mixing facts and hypotheses, we are forcibly reminded of these last.

If John Bernouilli and Leibnitz had reviewed their reasonings, as clearly as Euler afterwards did, they would not have been divided in opinion respecting the nature of the logarithms of negative and imaginary numbers. If Huyghens had seen, in the labour of the mathematician, nothing but the recollection of his own hypotheses, he perhaps would not have made use of an expression which Leibnitz relates. This last having shewn him, that a quantity compounded of impossible quantities, could be converted into a real quantity, “ Huyghens,” says Leibnitz, “ found this so wonderful, that he answered me, ‘ There is in this, something, “ which is incomprehensible by us.’ ”†

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* Would it not be still simpler and clearer to caution mathematicians against ever losing sight of the distinction between absolute and hypothetical truths?

† Leibnitz. Opera, Tom. III. p. 372. Lettre à Varignon.

"Je connois un professeur de logique, qui a coutume, dans ses cours, d'embarrasser à dessein ses élèves par des questions relatives aux rapports des quantités négatives et positives. Si un paradoxe les arrête, ils se tiennent pour avertis, qu'il ne peut y avoir dans les conséquences, que ce qui est implicitement contenu dans le principe ; et ils se donnent le soin de bien affermir celui-ci, je veux dire, de le réduire à des termes parfaitement clairs ; après quoi, il ne leur en coûte point de lever les difficultés. Mais si l'on n'est pas bien préoccupé de cette vérité fondamentale, on ne saura à quoi imputer l'anomalie, ou l'apparente contradiction, des conséquences.

"Personne n'admire plus sincèrement que je ne fais le génie de Jaq. Bernouilli, qu'il a si heureusement appliqué à la théorie des probabilités ; et je ne fais certainement aucune injure à sa mémoire, en le produisant comme un exemple de la facilité avec laquelle le mathématicien, séduit par ses belles découvertes, oublie un instant quel est le genre de vérité qui lui est propre. J'ai en vue la dernière réflection de son *Art de conjecturer.* D'une formule (très-belle sans doute et très-ingénieuse) par laquelle ce profond penseur a apprécié la probabilité d'approcher du rapport des causes en multipliant les effets; tout-à-coup il conclut à la régularité des lois que gouvernent l'univers.[*]

"On ne me reprochera pas d'avoir tiré mes exemples des écrits de quelques raisonneurs médiocres ; et l'on voudra bien croire, que si j'avois voulu puiser à de telles sources, j'aurois eu beaucoup de facilité à multiplier mes citations.

"Je pense donc enfin, qu'il faut que celui qui travaille dans les sciences de raisonnement pur soit bien averti, qu'il ne fait autre chose que retourner ses hypothèses, et que c'est là le seul moyen de prévenir des erreur assez dangereuses. L'opin-

I know a professor of Logic, who has a custom in his course, designedly to embarrass his pupils with questions respecting the relations of negative and positive quantities. If a paradox stops them, they consider themselves as warned, that nothing ought to be found in the consequences, which is not implicitly contained in the premises, and they are careful to establish this, I mean, to reduce it to terms perfectly clear. After this, they have no farther difficulties. But, if they are not fully possessed of this important truth, they will not know to what to impute the anomaly, or apparent contradiction of the consequences.

No one admires more sincerely than I, the genius of James Bernouilli, who has applied himself so happily to the theory of Probabilities; and certainly I do no injury to his memory, when I produce him as an example of the facility with which a mathematician, seduced by beautiful discoveries, forgot for an instant, what kind of truth comes within his province. I have in view the last reflexion of his *Art of Conjecture.* From a formula (very beautiful and very ingenious) by which this profound thinker has appreciated the probability of approaching the knowledge of causes by multiplying effects; he suddenly concludes as to the regularity of the laws which govern the universe.[*]

I cannot be reproached with having drawn my examples from the writings of ordinary reasoners; and it will be easily believed, that if I wished to draw from such sources, I could, without difficulty, multiply my citations.

In short, I am of opinion, that whoever labours in the sciences of pure reasoning should be reminded, that it is absolutely necessary to examine repeatedly his hypotheses, and that this is the only means to avoid dangerous errors. The opinion

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[*] Unde tandem hoc singulare sequi videtur, quod si eventuum omnium observationes per totam æternitatem continuarentur (probabilitate ultimo in perfectam certitudinem abeunte), omnia in mundo certis rationibus et constanti vicissitudinis lege contingere deprehenderentur; adeo ut, etiam, in maxime casualibus atque fortuitis, quandam quasi necessitatem, et, ut sic dicam, fatalitatem agnoscere teneamur; quam nescio annon Plato intendere voluerit, suo de universali rerum apocatastasi dogmate, etc.[†] Art. conj. p. 4. fine.

[†] [Hence this singular consequence would happen, that if observations of all events were continued through all eternity, (as the probability would at last end in absolute certainty,) all things in the world would be perceived to depend on fixed rules and a regular law of vicissitude ; so that, even in events the most casual and accidental, we should be held to believe in a certain necessity, and, if I may so speak, fatality. This, possibly, Plato might intend by his revolving Period.]

ion que je soutiens n'est donc point simplement une affaire de spéculation, dont il me seroit aisé de faire le sacrifice ; c'est une règle pratique qui doit servir de base à la partie de la logique qui s'occupe de cette espèce de vérité.

" V. Je dirai maintenant pourquoi, ATTACHE COMME JE LE SUIS, AU PRINCIPE DE L'IDENTITE, je crois néanmoins pouvoir espérer de ne différer qu'en apparence de l'excellent philosophe qui rejette ce principe. C'est parceque nous pensons l'un et l'autre que les définitions sont les vrais principes des mathématiques, et que tout le reste en dérive. C'est là sans doute l'objet principal. Et je m'assure, que quand ce philosophe viendra à discuter (avec plus de détail que son sujet ne l'appeloit à le faire) le vrai caractère de la bonne déduction, il finira par admettre, sinon les mêmes expressions, du moins au fond le même principe que j'emploie.

" Je vois en effet, et par son ouvrage et par sa correspondance, que ce sont les expressions sur-tout qu'il censure ; et quant à ce point là, je serai très-disposé à y apporter les changemens qu'il voudra bien lui-même me suggérer, pourvu toutefois qu'elles rendent correctement ma pensée.

" Ainsi après lui avoir exposé, dans une lettre, mes idées au sujet du principe d'identité, j'ajoutois : " Tout cela revient à dire, que la conséquence est con-
" tenue toute entière dans le principe. Ne pourroit-on pas donner à toutes les
" propositions mathématiques cette tournure : *Dire telle chose, c'est dire telle autre*
" *chose?*" Mr Dugald Stewart me répond là-dessus ; " Je suis parfaitement d'ac-
" cord avec vous, quant à l'esprit et à la substance de votre remarque. Celui qui
" admet la définition ou l'*hypothèse* ne peut pas nier ses diverses conséquences logi-
" ques, pourvu qu'il soit en état de comprendre chaque pas de la marche par la-
" quelle le principe et les conséquences sont liés ensemble. Je ne suis pas sûr toute-
" fois que, pour le gros des lecteurs, vous ne présentiez pas cette proposition d'une
" manière trop concise et trop figurée, quand vous dites que la conséquence est
" *contenue* dans le principe, ou qu'affirmer l'un c'est affirmer l'autre. Tout au
" moins je pense qu'il y a lieu de craindre que ces expressions ne suggèrent de faus-
" ses idées à ceux qui ne prendront pas garde au sens précis que vous donnez aux
" mots que vous employez." Je suis donc tout prêt à remplacer le mot *contenue* par un équivalent. Mais ce mot me semble pris ici dans un sens familier aux logi-

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which I maintain is not then simply a matter of speculation, which I could easily sacrifice. It is a practical rule, which ought to serve as the foundation of that part of logic which treats of this species of truth.

V. I shall now state, why, *attached as I am to the principle of Identity*, I nevertheless may hope, that I differ only apparently from the excellent philosopher who rejects this principle. It is because we both think that definitions are the true principles of mathematics, and that all the rest are derived from them. This is without doubt the principal object. And I assure myself, that when this philosopher shall come to discuss, with more detail than his subject has called him to do, the true character of just deduction, he will conclude by admitting, if not the same expressions, at least what is at bottom, the same principle which I employ.

I see in reality, both by his work and by his correspondence, that it is the mode of expression to which he principally objects ; and as to this point, I shall be well disposed to make such changes as he shall suggest, provided always, that they correctly express my meaning.

Thus, after having exhibited in a letter, my ideas on the subject of the principle of Identity, I add, all this is no more than saying, that the consequence is wholly contained in the premises. May we not give to all mathematical propositions this turn, *To affirm such a thing is to affirm such another thing?* Mr. Dugald Stewart answers me as above : " I perfectly agree with you, in the spirit and substance
" of your remark. He who admits the definition or hypothesis, cannot deny its
" different logical consequences, provided he be able to comprehend every step of
" the progress by which the principle and the consequences are united. I am not
" sure, nevertheless, that, for the bulk of readers, you do not present this proposi-
" tion in a manner too concise and too figurative, when you say that the conse-
" quence is *contained* in the principle, or, that to affirm the one is to affirm the
" other. Above all, I think there is reason to fear, that these expressions may
" suggest false ideas to those who do not carefully adhere to the precise sense which
" you give to the words which you make use of." I am very ready to exchange the word, *contained*, for an equivalent, but this word seems to me to be taken in a

ciens ; car c'est précisément ainsi que l'on dit communément que l'espèce est comprise dans le genre.[*]

"Un autre mot, que relève Mr Dugald Stewart, est celui de proposition *identique*.[†] Il me fait remarquer, que plusieurs bons logiciens ont appelé de ce nom les propositions qui ne font que répéter le même mot aux deux termes (A est A), et qu'ils désignent ces propositions comme inutiles et nugatoires. Je renoncerai sans discussion, sur l'autorité de ces logiciens, à l'expression que j'ai adoptée, quoique je puisse opposer autorité à autorité. Mais je desire conserver un mot qui *exprime*, de manière ou d'autre, ma pensée. Comme dit Campbell,[‡] cette phrase "quatre "est quatre," n'offre qu'une proposition inutile et véritablement nugatoire. Mais dire "deux fois deux font quatre," c'est présenter la même idée sous deux faces ; et un tel travail est, comme on sait, fort utile. Je m'étois accoutumé à appeler

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sense familiar to logicians; for it is precisely in the same manner that we say the species is contained in the genus.[*]

Another word which offends Mr. Stewart, is that of an *identical* proposition.[†] He reminds me, that many good logicians have called by this name, propositions which do nothing more than repeat the same word in the two terms, (a is a,) and that they designate these propositions as nugatory and useless. I will renounce without discussion, upon the authority of these logicians, the expression which I have adopted, although I could oppose authority to authority. But I am desirous to retain a word which expresses in some mode or other my meaning. As Campbell says,[‡] This phrase, *four* is *four*, presents a proposition entirely useless and nugatory. But to say, twice *two* are *four*, is to present the same idea in a different light ; and this is often, as we know, very useful. I am accustomed to call the for-

[*] "Si l'on peut dire que la notion de triangle est comprise dans celle de polygone, on pourra dire de certaines propositions sur les triangles qu'elles sont comprises dans leurs analogues sur les polygones. Si donc on a prouvé, par exemple, que dans tout polygone, les angles extérieurs sont égaux à quatre droits, on pourra de ce principe tirer la conséquence pour les triangles. Et cette conséquence semble pouvoir être dite *contenue* dans son principe."[§]

With this remark I perfectly agree ; for he who knows the general theorem is in actual possession of all its particular cases ; insomuch that, after this theorem has been once brought to light, no other person can afterwards lay claim to any one of the cases as an original discovery. After it had been demonstrated, for instance, that in *every* rectilineal figure, the exterior angles are equal to four right angles, no geometer could well think of announcing, as a new proposition, that the same theorem holds with respect to every *triangle*. The particular cases, therefore, may all be said, with perfect propriety, to be *contained* in the general theorem. But how widely does this differ from the meaning annexed to the same word, when it is said, that all the properties of the circle, whether discovered or *undiscovered*, are *contained* in Euclid's definition of that curve ?

[†] "Mr. Dugald Stewart reproche aussi quelque part au mot *d'identité* d'être emprunté des scolastiques, mais ce n'est point là une tache à mon avis ; car (comme disoit Leibnitz en parodiant un mot de Virgile ;) il y a de l'or dans ce fumier. De plus en Anglais on pourroit peut-être se passer de ce mot, en Français on ne le peut pas. Nous parlons une langue timide, qui s'effraie du moindre néologisme."[‖]

[‡] Voyez Bibl. Brit. p. 32 de ce volume.—Littérat. Vol LVIII. No. 3, Mars 1815.

[§] [If we are permitted to say, that the notion of a triangle is comprised in that of a polygon, we may say of certain propositions upon triangles, that they are comprised in their analagous propositions upon polygons. If, then, having proved that in every polygon the exterior angles are equal to four right angles, we may from this principle, draw the consequence for the triangles. And it seems not improper to say, that this consequence is *contained* in the principle.]

[‖] [Mr. Dugald Stewart objects in some measure to the word *identity*, that it is borrowed from the schools ; but this in my opinion is not a fault, for (as Leibnitz says in a parody upon a line in Virgil) there is gold in this smoke. Besides, in English they may be able to do without this word. In French, we cannot. We speak a language which is timid, and fearful of the least neologism.]

tautologiques les premières, et *identiques* les secondes. Je suis tout prêt à changer cette habitude, pourvu que l'on me fournisse un mot à substituer.*

“ Enfin Mr Dugald Stewart joint à ces critiques une remarque, qui fait voir qu'un des motifs, pour lesquels il s'est élevé contre le principe d'identité, est la crainte qu'il n'entraîne dans quelques conséquences fausses ou même dangereuses. Voici comme il s'exprime sur la fin de la lettre, dont je viens d'extraire les observations précédentes : “ A toutes ces propositions, *comme vous les entendez*, je souscris “ sans difficulté. Mais n'est-il pas à craindre qu'elles ne fassent naître dans l'esprit “ de quelques lecteurs des idées différentes de celles que vous y attachez ? Et n'ont- “ elles pas une tendance à donner un air paradoxal à une doctrine, qui, lors-qu'elle “ est proposée d'une manière un peu pleine, ne donne aucune prise au doute ou à “ l'hésitation ? Quelle étrange conséquence a été tirée de l'usage de ce mot *identité*, “ par un philosophe, tel que Diderot ! *Interrogez*, dit-il, *des mathématiciens de bon- “ ne foi, et ils vous avoueront que leurs propositions sont toutes identiques ; et que “ tant de volumes sur la cercle, par exemple, se réduisent à nous répéter en cent*

mer *tautological*, and the latter identical. I am very ready to change this habit, provided I can be furnished with a word which I may substitute in its place.*

Finally, Mr. Dugald Stewart adds to his criticisms a remark which shows that one of his motives for opposing the principle of identity, is the fear that it may bring with it some consequences which are false, and even dangerous. He expresses himself in the following manner at the end of the letter from which I have extracted the foregoing observations : “ To all these propositions as *you understand* “ *them*, I subscribe without difficulty. But, is there not reason to fear that some “ readers may draw from them, ideas different from those which you intend ? And “ have they not a tendency to give a paradoxical air to a doctrine, which, when “ proposed in more distinct terms, gives no room for doubt or hesitation. What a “ strange conclusion has been drawn from the use of this word *Identity*, by such a “ philosopher as Diderot ? *Put the question, says he, to any candid mathemati- “ cian, and he will acknowledge, that all mathematical propositions are merely iden- “ tical ; and that the numberless volumes, written (for example) on the circle, only “ repeat over in a hundred thousand forms, that it is a figure in which all the straight*

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* The distinction marked in the above passage, between *tautological* and *identical* propositions is precise and important ; but the meaning annexed to the latter epithet does not appear to me agreeable to established use ; according to which, *identical propositions* are exactly of that description to which the name of *tautological* is here applied. I have looked into every book of logic within my reach, and find their language on this subject perfectly uniform. Locke defines identical propositions to be those in which a term is affirmed of itself : and he gives as instances, “ a soul is a soul,” “ a spirit is a spirit,” “ a “ law is a law,” “ right is right,” and “ wrong is wrong.”—The definition of identical propositions given by Crousaz coincides exactly with that of Locke : “ Quando subjecti et attributi sedem idem occupat terminus, eodem sensu prorsus veniens , propositio talis dicitur identica ; et nugatoria est.”†—Condillac, one of the highest authorities, certainly, among French logicians, expresses himself in the same manner. “ Tout le systême des “ connoissances humaines peut-être rendu par une expression plus abrégée et tout-a-fait “ identique : *les sensations sont des sensations*. Si nous pouvions, *dans toutes les sciences*, “ suivre également la génération des idées, et saisir le vrai systême des choses, nous ver- “ rions d'une vérité naitre toutes les autres, et nous trouverions l'expression abrégée de “ tout ce que nous saurions, dans cette *proposition identique* ; LE MEME EST LE MEME.”‡ Does not the last of these propositions, as well as the first, fall under the class of tautological or nugatory propositions ? and, if this be the case, will it not follow, that the asser-

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† [When the same term occupies the place of both subject and attribute, and is understood in exactly the same sense, such a proposition is said to be identical, and is nugatory.]

‡ [The whole system of human knowledge, may, perhaps, be rendered by an expression more abridged, and entirely identical : *sensations are sensations*. If we were able, *in all the sciences*, to follow equally the generation of ideas, and seize upon the true system of things, we should discover, that from one truth spring all others, and should find the shortest expression of all that we could learn, in this identical proposition, *the same is the same*.

" *mille façons différentes, que c'est une figure, où toutes les lignes tirées du centre à* " *la circonférence sont égales.* NOUS NE SAVONS DONC PRESQUE RIEN."[*]

" Cette dernière conclusion, à laquelle arrive Diderot, est d'autant plus étrange, comme le dit celui que la cite, que c'est précisement parce que les mathématiques travaillent sur la vérité conditionnelle, qu'elles sont douées d'une pleine certitude, ainsi que j'ai tâché de la faire voir ailleurs,[†] et que c'est par consequent à ce titre qu'elles meritent éminemment le nom de *science.* Mais de ce qu'un philosophe, tel que Diderot, s'est égaré dans une conséquence à laquelle sans doute il aspiroit, je ne crois pas que l'on doive conclure à la nécessité de changer un langage philosophique et conforme à la verité. Si ce langage a une apparence de paradoxe, ce que je ne sens pas, il faut tâcher de la réformer, à quoi je suis bien disposé à coopérer.

" Dans tout le volume que j'extrais, il n'est plus question de la discussion qui vient de nous occuper. Je ne crois pas en conséquence avoir occasion d'y revenir. Ce n'est pas même sans regret, et sans une sorte de répugnance, que je l'ai entreprise. Je ne la terminerai pas sans rappeller encore une fois que l'espèce d'opposition qui règne entre nos opinions est moins réelle qu'apparente, et que Mr Dugald Stewart a judge lui-même que c'étoit sur les mots que nous différions, plutôt que sur le fond des choses."

ARTICLE II. (See page 176.)

FOR the contents of this Article, as well of the former, I am indebted to M. Prevost. They are extracted from a letter, dated Geneva, 9th April, 1815.—My readers will thus be put in possession of the opinion of my learned friend on the only two questions of any moment which we have had occasion to discuss in the course of our long literary correspondence. The difference between us, in both instances, I perfectly agree with him in thinking, is more apparent than real.

" *lines drawn from the centre to the circumference are equal.* THE WHOLE AMOUNT " OF OUR KNOWLEDGE, THEREFORE, IS NEXT TO NOTHING."[*]

This last conclusion to which Diderot comes, is the more strange, as he who cites him observes, that it is precisely because mathematics are occupied with conditional truth, that they arrive at complete certainty, as I have elsewhere tried to shew;[†] and it is in consequence of this title, that they merit eminently the name of science. But because a philosopher, such as Diderot, has puzzled himself with a conclusion, at which, without doubt, he aimed, I do not think we ought to conclude it necessary to change a language which is philosophical and conformable to truth. If this language have an appearance of paradox, which I do not perceive, it is necessary to try to reform it, in which I am well disposed to co-operate.

In the volume from which I have made extracts, we find no other mention of the subject with which I have now been occupied. I think, therefore, there will be no necessity for resuming the discussion of it. It has not been without regret, and some degree of repugnance that I have engaged in it. I shall not terminate this notice, without once more remarking, that the distance betweeen our opinions is less real than apparent; and Mr. Dugald Stewart is himself of opinion, that it is rather respecting words, than upon any fundamental principles, that we differ.

tion which gave rise to this discussion requires some modification ?—" C'est en répétant " sans cesse, *le même est le même*, que le géomètre opère tous ses prodiges."§

[*] Lettre sur les aveugles.

[†] Des Signes, p. 15 et 25 et suiv.—Essais de Philos. Tom. II. p. 12 et 13.

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§ [It is by repeating without cessation, *the same is the same*, that Geometry performs all its wonders.]

(1) ——" Mais il y a une autre question sur laquelle nous différons, ou du moins nous ne nous exprimons pas de même. C'est ce qu'établit d'une manière positive, et dans des expressions bien honorables pour moi, la note qui se trouve au bas de la page 311* de ce même 2d volume de vos *Elem. of the Phil.* &c.—Ce qu'il y a de singulier, c'est qu'encore ici, j'ai lieu de croire que notre dissentiment est moins réel qu'apparent, et que la controverse sur ce point n'est pas moins verbale que sur l'autre, peut-être plus, ou du moins plus évidemment telle. La chose vaut la peine d'etre éclaircie.—Et d'abord, vu la distance qui nous sépare, oserois-je vous prier de relire ici ce que je dis à la page viii et ix de ma préface à la traduction de votre premier volume. Vous y verrez que je n'établis aucune différence entre nous relativement à la nature des causes physiques.† En citant à la p. 311‡ du 2d vol. les deux phrases aux quelles

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(1) But there is yet another question upon which we differ, or at least, upon which we do not express ourselves alike. It is that which establishes in a positive manner, and in expressions very honourable to me, the note which is at the bottom of page 311* of this second volume of your *Elements of the Phil.* &c. What is remarkable, I have still reason to think our difference of opinion less real than apparent, and that the controversy upon this point is not less verbal than upon the other, perhaps even more so, or at least more evidently so. The matter is worth the trouble of illustration. And in the first place, considering the distance between us, shall I dare to request you to read over again what I say at pages viii and ix of my Preface to the translation of your first volume. You there find that I do not admit any difference between us as to the nature of physical causes.† In citing at p. 311‡ of the second volume, the two passages to which you have reduced

* Page 176 of this edition.

† The passage here referred to by M. Prevost is as follows:

" Je n'entend pas toutefois souscrire implicitement à toutes les opinions de l'auteur. Je me suis prescrit dans cette traduction de rendre fidèlement ses pensées, et je n'ai pas cru devoir toujours lui opposer les miennes, dans les cas rares où je ne me trouvois pas d'accord avec lui. J'en donnerai un seul exemple. L'auteur envisage comme contraire aux principes d'une saine philosophie la recherche de la cause ou du mécanisme de la gravitation. Ceux qui ont connoissance des travaux entrepris et exécutés par G L. Le Sage sur cette matière, savent qu'une telle recherche est compatible avec la méthode philosophique la plus rigoureuse. Je suis pleinement d'accord avec M. Stewart, quant à la règle générale à laquelle cette maxime particulière se rapporte. Il y a une limite, que le philosophe doit reconnoître, et au-delà de laquelle il ne doit pas pousser ses recherches. Mais je diffère sur la place où cette limite doit être posée ; en convenant toutefois, que la recherche du mécanisme de la gravitation a été l'occasion d'une multitude d'erreurs, et que c'est un véritable écueil qui doit être soigneusement évité par ceux qui dèbutent dans la carrière des sciences philosophiques. Quoique cette question soit très intéressante en physique, elle l'est moins en métaphysique, ou plutôt en logique ; puisque dans cette dernière science ce n'est qu'un exemple d'une règle qui a beaucoup d'applications. Par cette raison, je m'abstiendrai d'entrer ici dans la discussion de ce point contest."§

‡ Page 176 of this edition.

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§ [I do not mean at all times to assent to all the opinions of the author. I have imposed upon myself in this translation, the duty of exhibiting his thoughts with fidelity, and I have not thought it necessary always to state my own in opposition to them, in those rare cases when I do not agree with his conclusions. I shall give one example of this The author views as contrary to the principles of sound philosophy, an inquiry into the cause or mechanism of gravitation Those who are acquainted with the labours undertaken and executed by G. L. Le Sage upon this point, know that such inquiry is not incompatible with the most rigorous philosophy. I am fully in opinion with Mr. Stewart, as to the general rule to which this particular maxim belongs. There is a limit which the philosopher should be careful to observe, and beyond which he ought not to extend his researches. But I differ as to the place where this limit should be fixed; always granting, that the inquiry into the mechanism of gravitation has been the occasion of a multitude of errors, and that it is a dangerous rock, which should be carefully avoided by those who enter upon a career in the philosophic sciences. Although in physics this question is very interesting, it is less so in metaphysics, or rather in logic; since in this last science, it is nothing more than an example of a rule which has many applications; for this reason, I shall avoid entering in this place upon the discussion of this contested point.]

vous réduisez mes opinions à ce sujet, il vous a échappé que la première de ces phrases étoit modifiée par celle qui la suit et que vous avez omise. Cette modification est tout-à-fait essentielle. “Si l'on analyse le mot *force* ou *énergie*, et qu'on “ se borne aux causes naturelles; on verra que cela signifie que l'effet suit constamment la cause par quelque loi de la nature.” Dans mes cours d'enseignement, j'insiste beaucoup sur cette définition, à laquelle je ne crois pas que (dans vos idées telles que je les connois) vous ayez rien à objecter. Elle présente en effet le même caractère des causes physiques que Hume et vous; et elle *répond* en même temps à une difficulte de Reid, tres-fondée si on n'y met aucune limite. Est-il besoin avec vous de détails et d'exemples? Je ne le pense pas. Cependant la crainte d'etre obscur me fera ajouter un mot. A la nouvelle lune de Mars, les Mahométans se tiennent prêts à voir, et dès qu'ils l'aperçoivent ils jettent un cri. Ce cri est bien un signe, mais non une cause de l'apparition que j'aurai devant les yeux en les tournant vers le ciel. Il précéde, mais ce n'est pas en vertu d'une loi. Réciproquement, un corps électrique étant frotté un autre corps s'en approche, je dis indifferemment que l'un de ces corps attire l'autre, ou que l'électricité est la cause de ce mouvement. C'est que ces faits se suivent en vertu des lois de l'électricité. Et il est entendu que l'on remonte, tant que l'on peut, de cause en cause. Ainsi l'on pourroit demander la cause de l'électricité; comme on pourroit demander celle de la fièvre, qui elle-même est la cause du délire, &c. &c. Je dis donc que nous sommes pleinement d'accord sur la nature des causes physiques, à moins (ce que je ne prévois pas) que vous ne me contestiez la distinction que j'établis entre cause et signe.—Le point sur lequel nous ne sommes pas d'accord (et où j'ai contre moi, outre vous, plusieurs nobles autorités) est une question de physique pure; savoir: la cause de la gravitation est-elle au nombre de celles dont on doit s'occuper? Persistons à cet égard chacun dans notre opinion. Il est probable que ce champ de discussion ne nous engagera pas dans une controverse directe, et je m'en féliciterai.—Je passe à remarquer la différence entre *loi* et *cause*. Une loi est un rapport, ou mieux, un rapport de rapports, une proportion. C'est une chose théorique; c'est une généralisation; une loi ne peut agir. Il faut donc un agent; une cause, pour réaliser un changement. Exemple. “Si le pole nord d'un aimant est “ approché du pole sud d'un autre aimant, il y a attraction.” C'est une loi.

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my opinions, it has escaped your observation, that the first of those passages is modified by one subsequent, which you have omitted. This qualification is very essential. “If we analyze the word *force* or *energy*, and confine ourselves to natural causes, we shall find that this signifies the effect following the cause by some law of nature.” In my course of instruction I insist much on this definition, to which, I believe, as far as I know your ideas upon this subject, you will not object. It presents, in fact, the same character of physical causes with Hume and yourself, and obviates a difficulty of Reid, well founded if no limit be assigned to it. Is there any need with you of details and examples? I think not. Nevertheless, the fear of being obscure causes me to add a word. At the new moon in March, the Mahometans hold themselves in readiness to observe its rising, and as soon as they perceive it, send forth a loud shout. This shout is a sign, but not a cause, of the appearance which I shall have before my eyes, when I turn them to the heavens. It precedes it, but not in virtue of a law. Two electric bodies when rubbed, reciprocally approach each other. I say, indifferently, that one of these bodies approaches the other, or that electricity is the cause of this movement. This is because those facts follow each other by virtue of the laws of electricity. It is understood that we ascend as far as we can, from cause to cause. Thus we may inquire the cause of electricity; as we may that of a fever, which is itself the cause of delirium, &c. &c. I say then, that we are fully agreed upon the nature of physical causes; at least, if you do not object to the distinction which I make between a cause and a sign, and this I do not foresee. The point upon which we are not agreed, and on which I have against me besides yourself many other great authorities, is a question purely physical: for instance, Is the cause of gravitation among those which should be subjects of inquiry? In this respect let us retain each his own opinion. It is probable upon this field of discussion we shall not engage in a direct controversy, and I am glad of it. I go on to remark the difference between *law* and *cause*. A law is a relation, or rather, a relation of a relation, a proportion. It is a speculative thing; it is a generalization. A law cannot act. It is necessary there should be an agent, a cause, to produce a change. For example, “If the north pole of a “ magnet is brought near the south pole of another magnet, it has an attraction.”

Mais ce simple énoncé ne *produit* rien. Maintenant j'ai sur ma table deux aimans, j'oppose leurs poles antagonistes ; la cause y est ; l'attraction (ou approche) suivra d'après la loi.—J'ai risqué de proposer que le mot *agent* fût plus particulièrement consacré aux causes impulsives, parce-qu'elles sont celles qui produisent des phénomènes très communs, très-bien discutés, et universels. Je n'ai proposé cela qu'avec une expression de doute ; et je n'ai rien à dire à ceux qui s'y refusent.—Pour mieux montrer que la distinction de *loi* et *cause* est nécessaire en physique, j'userai d'un exemple. Un homme, venu de je ne sais où, voit un cheval qui traine un chariot ; mais il n'aperçoit point les traits. A chaque pas que fait le cheval, il voit le chariot avancer.* Il en conclut que le cheval est cause du mouvement du chariot. Il pénétre plus avant et trouve les traits ; il reconnoît que ce mouvement se rapporte à l'impulsion. Tout cela suppose qu'il connoit les lois de celles-ci. Le cheval est une cause, le trait est une cause plus reculée. C'est celle-ci que j'appellerois un agent. Mais pour cette dernière dénomination je ne dois pas trop y tenir.—Quant à la fiction de Boscovich, purement hypothétique ; j'avoue que je ne vois pas qu'elle soit d'un grand poids en faveur de ceux qui inculpent la recherche de la cause de la gravitation. J'aurois sur ce sujet plus à dire ; mais comme c'est purement un point de physique, il me semble que je puis ici m'en abstenir."

This is a *law*. But this simple expression *produces* nothing. I have now upon my table two magnets. I bring their antagonist poles into opposition. The cause is here ; attraction (or approach) follows by the law. I have risked proposing that the word *agent* should be devoted particularly to impelling causes, because these are the causes which produce phenomena the most common, the best examined, and universal. I have proposed this with an expression of doubt, and having nothing to offer to those who reject it. To show still more clearly that the distinction between *law* and *cause* is necessary in physics, I shall make use of an example ; A man, come from I know not whence, sees a horse which draws a chariot ;* but he does not perceive the traces. At every step which the horse takes, he sees the chariot advance. He concludes from this, that the horse is the cause of the movement of the chariot He approaches nearer, and sees the traces. He perceives that this movement has a relation to the impelling power. All this supposes that he knows the laws of these. The horse is the cause, the traces, another cause, more remote. This I should call an agent ; but of this last denomination, I should not be very tenacious. As to the fiction of Boscovich, purely hypothetical, I confess I do not see that it adds much weight to those who blame researches into the cause of gravitation. I should have more to say upon this subject, but as it is purely a question of physics, I think I may in this place be permitted to abstain from a discussion of it.

END OF VOLUME II.

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* Il est entendu que ce fait se répéte souvent d'une manière uniforme sur plusieurs chariots pareils et itérativement sur chacun.†

† [It is supposed that this fact is often repeated in an uniform manner, upon many similar chariots, and repeatedly upon each.]